"THE IMPLICATION OF EXPENDITURE ELASTICITIES ON IMPORTS OF CONSUMER PRODUCTS IN KENYA "
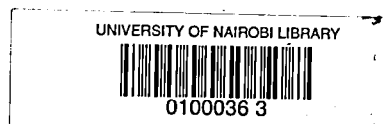
BY

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RESEARCH PAPER PRESENTED TO THE DEPARTMENT OF ECONOMICS, UNIVERSITY OF NAIROBI, FOR THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN ECONOMICS.
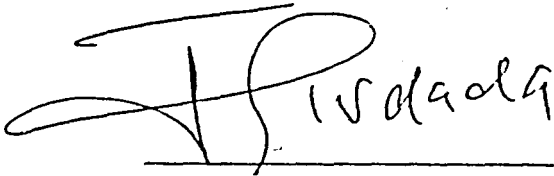
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This research paper is may original work and has not been submitted in any other university for a degree.

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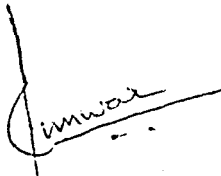Kariuki P. G.

This research paper has been submitted for examination with our approval as university supervisors.

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helped me and also spent many weeks attempting to trace and extract the data for me even though he was very busy. In connection with data extraction and interpretation I would like to thank mr. Okoth and mr. Mwangi Muthaa for their assistance.

Special thanks goes to my parents particulary my mother Esther Wambui Maina for her dedication, sacrifice moral support and patience during the whole of my academic life. Without her assistance, guidance, moral support, and love, it would not have been possible to go through the education system I have under gone.

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The findings and ideals expressed in this paper are those of the author and any mistakes or shortcomings should not be blamed on any of the above mentioned people.

May God bless all those who made this paper a success Amen.

ABSTRACT

The paper is concerned in estimating expenditure elasticities, making demand projections and bringing out the implications on imports of several consumer products mainly foodstuffs. Kenya has been importing a large proportion of its consumer products particularly foodstuffs and as revealed by this study the growth rate in demand for such products is quite high. Consequently, the implied growth in demand is even higher than the domestic production growth rate in most cases. This should send danger signals to the Government and the relevant ministries and departments especially the ministry of agriculture and livestock development. It is evident from the result that, while different factors affect demand for different commodities differently, income, household size and education are the most important ones. The results reveal that, one of the country's Major objectives of achieving self-sufficiency in food supply and security has already been challenged and might continue to be challenged in the future. Considering that Kenya like other developing countries experience shortage of foreign exchange the depth of the problem is great. The study reveal several interesting but surprising results. first several foodstuffs emerged as luxuries. Theoretically, food is classified under the category of necessities but the results of this study prove otherwise for several food commodities. The conditions leading to these results are explained in the text. The other interesting result is that, different forms of cereals like maize grain and maize flour appear as "substitutes" with respect to household size changes. The other rather surprising result is that all the imported commodities studied emerged as luxuries save for rice but its expenditure elasticity was also high.

Most of the studies results are close to those of other studies and some of the projections are close to those obtained by Government in the sessional paper number one of 1986 on Economic Management for renewed growth. It is evident that unless the production growth

rates of several products especially food crops is accelerated the country will not be able to feed its rapidly increasing population in the future. Moreover, several measures need to be executed with respect to policies concerning population growth as well as production generally.

DEDICATION

I dedicate this paper to my mother Esther Wambui Maina

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CHAPTER ONE

INTRODUCTION

Consumer behaviour has a significant role in economics and the final target of most, if not all human activities, in all circles of life is directly or indirectly related to consumption. Consumer expenditure takes the largest percentage of gross domestic products (GDP) of most economies. In Kenya for instance, total consumption have averaged about 80% for the last two decades (i:e 1970-90) and both Private consumption as well as total consumption have been increasing[1]. Even when one considers the value of total private consumption at constant 1982 prices the trend is an upward one since 1985. In 1990 private consumption as a percentage of GDP was about 71% (Economic Survey 1991). Although the percentage change in public, private and total consumption have been fluctuating, on an average it has been considerably high, 16.2% for private consumption, 15.9% for public consumption and 16.1% for total consumption (Averages calculated for the data covering the period 1972-1990).

The knowledge of the allocation of consumers' expenditure can be vital in many economic fields particularly in development planning.

In the real world no economy is completely planned or completely unplanned. Planning is a matter of degree. In developing nations, development planning has become almost generally accepted as a vital mechanism for economic development. The resulting consumers' expenditure pattern due to income and population growth over time will influence the industrial structure as well as the structure of other sectors of an economy.

Since independence, Kenya has been importing a number of consumer products including foodstuffs like rice, sugar, and wheat. Since 1982 the import surplus has been fluctuating but

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[1] See table 4 in Technical paper 91-92 long range planning division december 1990 or statistical abstracts and Economic Surveys various issues.

from 1986 it has been increasing, -103 for 1986, 334.5 for 1987, 389.5 for 1988 494.7 for 1989 and 588.1 for 1990, respectively (Economic Survey 1991). Imports of several commodities have been increasing since 1982 and though the percentage change in imports has been fluctuating, there have been an increase since 1985. Moreover, the percentage change have been high on average, 17.4% for the period 1972 to 1990. Kenya has been a net importer of a number of products as is evident from table 1 in appendix 2. By 1986 Kenya was depending on 30%-40% imports for its wheat requirements. In some cases acute shortages have been known to exist. Data obtained from the Economic Survey of 1991 reveal that, imports of food and beverages as a percentage of total imports has been rising in the last three years. These have been happening during the era when several structural adjustment programmes and long-term policies and strategies have been in operation as is well expressed in Sessional paper number one of 1986 on Economic development for renewed growth, development plans and other Government publications.

The shortages mentioned above which necessitate imports in most cases, can be attributed to political, demographic, social, climatic and environmental factors, but more specifically to economic factors like limited or lack of demand projections based on consumers' expenditure.

The impact of population growth rate cannot be ignored. As a result of the high population growth rate (3.9%) in Kenya, there has been competition for the available resources between consumer products and capital goods. Since 1986 the percentage rate of growth of gross fixed capital formation has been declining: 11.89 for 1986, 5.97 for 1987, 5.25 for 1988, -2.61 for 1989 and -6.95 for 1990, respectively. Over the same period, a large proportion of government expenditure has been going to finance basic services such as education, defence, health care and internal security. Such expenditures are not directly productive. Moreover,

Government deficit has been on the increase and the alternative sources of financing the deficit have their own limitations. For example, internal borrowing results in to crowding-out effect, while external borrowing leads to external-debt problem. The annual debt service accounted for only 5% of export earnings in 1960 but by 1984 it had increased to 30%.

In 1989, exports grew by only 7.1% while imports grew by 26.8%. As a result, trade deficit increased to K£ 1,219 million compared to deficits of K£ 812 million and K£ 641 million in 1988 and 1987, respectively (Economic Survey, 1990). The large increase in imports and low growth of exports implies a shortage of foreign exchange. Thus if Kenya continues to rely on imports, especially for consumer goods, the external deficit crisis is bound to deepen. Several researches, however, show that some of the imported products could be produced locally, using local materials and employing a number of people. Moreover, substantial foreign exchange could be saved through proper planning and implementation of sound consistent policies and strategies.

Thus the problem of commodity shortages could be minimised through proper demand projections and planning for domestic production both in the short-run and in the long-run. In fact, the macro-economic policy model for Kenya is based on very broad categories of sectors, in conformity with the recommendation that a desegregated approach be followed in each sector in making projections for final expenditure demand, classified by commodity groups or otherwise, In practice, however, this is not being done, the main objective of this paper is to underline the utility of implementing this recommendation, by estimating expenditure elasticities and making demand projections from the elasticities, as well as deriving the implications of the projections on "external trade". It is hoped that the results of the study will be useful to policy makers and planners in their attempt to ameliorate some of the mentioned problems.

1.1. STATEMENT OF THE PROBLEM

One of the major development objectives in Kenya is to achieve self-sufficiency in food supply and to insure food security in the country. This broad objective was particularly emphasised on in 1981 when the National food policy was formulated. The main goals as expressed in the sessional paper no. 4 of 1981 on national food policy were,

1. To maintain a position of broad self-sufficiency in the main foodstuffs in order to enable the nation to be fed without using scarce foreign exchange on food imports.

2. To achieve a calculated degree of security of food supply for each area of the country.

3. To ensure that these foodstuffs are distributed in such a manner that every member of the population has a nutritionally adequate diet.

To achieve such set targets Kenya is required to expand the production of the main foodstuffs at a rate that have not been achieved by several countries[2]. The National food policy was formulated to avoid future shortages in food supply, ensure food self-sufficiency, and to eliminate the need to use foreign exchange on food imports. However, a decade after these policies were set, Kenya has been importing several foodstuffs as well as other consumer products[3] revealing that the targets set are yet to be achieved. Considering the rapid growth rate in population the future look gloomy for Kenya. Moreover, the growth rates pointed out in the National food policy (1981) were based on market demand and when one consider the inequality in distribution of income, poverty levels and nutritional required, the depth of the problem is obvious. Some of the imports do not reflect the gap between

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[2] Government of Kenya Sessional paper no 4 of 1981 on National food policy. Government printer Nairobi.

[3] See table 1 and or Statistical Abstracts and Economic Surveys various issues.

domestic demand and supply but rely on the availability of the foreign exchange among other factors.

The consumption expenditure, especially of food commodities has been increasing at a very high rate. Aggregate consumption expenditure accounted for more than 90% of GDP in Kenya in 1990. This can be attributed mainly to the growth in income and the rapid population growth rate in Kenya.

The rapid increase in consumption expenditure has resulted into domestic demand outstripping supply, which has led to continuous imports of large quantities of some of the food products. For example, in 1990 Kenya spent Kshs 564 million and Kshs 2 billion to import wheat and vegetable oils, respectively. Kenya has also been importing other commodities like sugar and rice, among others. In some cases, acute shortages have occurred, particularly with respect to sugar and wheat. When such shortages occur, consumers spend a considerable amount of their time, looking for and lining up for the commodities, especially in the urban areas. Moreover, substantial foreign exchange is used to import such products, which, with proper planning and demand projections could be produced in sufficient quantities domestically. For example, although Kenya has 1.8 million hectares of land available for growing wheat, only 138,000 hectares were under wheat in 1990.

Considering the multidimensional nature of development process[4] inadequacy in food supply can reduce development of a country and in fact result to economic instability of such a country. Moreover, while increased importation might help solve the problem of shortages in the short-run, it cannot constitute a sustainable solution, especially in Kenya where the value of exports has always fallen short of the value of imports. In 1989, for example, the

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[4] See figure 1 in appendix 1 or consult Todalo M.P. Economics of a developing world Longman group limited Longman house 1982 chapter six.

balance of trade deficit was twice than the value of exports (Economic Survey 1990).

As mentioned earlier some of the above problems could be solved through proper planning and demand projections and the implication on external trade, based on expenditure elasticities. This is the broad objective of the study. Specifically the study has the following objectives.

1.2 OBJECTIVES OF THE STUDY

1. To specify and estimate a demand model that will yield expenditure elasticities and household size elasticities among other elasticities like, the level of education of the head of the household and, years of urban residence for selected commodities.

2. On the basis of the expenditure elasticities, make demand projections for the commodities chosen.

3. Find the implications of these elasticities on imports of selected consumer commodities.

4. Draw policy recommendations on the basis of 1-3 above.

1.3 SIGNIFICANCE OF THE STUDY

Changes in industrial structure of any economy over time are brought about by changes in demand and in consumers' expenditure which are themselves brought about by economic growth and development. So, the pattern of consumer expenditure is important to industrialists and other investors in determining which products have fast-growing demands and, therefore, offer greater investment potential. Demand projections constitutes an important aspect of planning. Consumption embraces all economic activities, and, as mentioned in the introduction, private consumption accounts for a significant proportion of

GDP of most economies. The drawing of national plans involves budgeting for future consumption, which in turn requires sufficient knowledge of future demand patterns. This study will provide vital information to economic planners in Kenya, both in the public and private sectors. The study can also be important to industrialists and farmers.

CHAPTER TWO

LITERATURE REVIEW

2.1 THEORETICAL LITERATURE

Keynes (1936) argued that aggregate consumption expenditure can broadly be attributed to both subjective and objective factors, the psychological propensities, habits of individual in a certain society, as well as the factors influencing income distribution[5]. Keynes contended that the consumption function can be formulated as follows;

$$C_W = X(Y_W)$$

Where, C_W = consumption expenditure in terms of wage-units.

Y_W = income in terms of wage-units.

Among the objective factors, Keynes argued that, real consumption was principally a function of real, rather than, money-income.The implication of the psychological law is that people will, as a rule, on the average increase their consumption expenditure as income increases, though less proportionately than the latter. Thus Keynes postulated that, the marginal propensity to consume (MPC) and income elasticity of demand were positive but less than unity[6].

He further contended that the average propensity to consume (APC) was greater than MPC at all levels of income.

However, research executed by Kuznets revealed that APC was equal to MPC (0.88). The conclusion was that Keynes' consumption function was a short-term one. Due to the

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[5]. Keynes J. M. The theory of employment, interest and money. Macmillian London Melbourne Toronto 1967 page 91.

[6] ibid page 96.

inconsistency of short-run and long-run consumption results, several other theories of consumption were developed.

Duesenberry (1949)came up with the relative income hypothesis. His argument was that household expenditure behaviour mainly relied on relative income and not on the absolute income as postulated by Keynes. He disagreed with Keynes on the assumption that households' consumption behaviours were independent of each other.

He made the conclusion that, the environment in which consumers live will affect their "consumption patterns". For example, he pointed out that if a particular household's income is higher than that of the average household within the same environment, then its consumption would be lower and vice versa. To explain the short-run consumption function, Duessenberry utilised the concept of previous highest level of income and the notion of ratchet effect such that, should income decrease below the highest previous level attained dis-saving will take place and vice versa. As a result, the consumption patterns of households were assumed to be irreversible over time.

The consumption function was formulated as shown below;

$$\frac{C_t}{Y_{dt}} = \frac{1 - S}{Y_{dt}} = 1 - \frac{(aY_{dt} + b)}{Y_d^*}$$

where, C_t = consumption in time period t

Y_{dt} = personal disposable income in time period t.

Y_d^* = the highest level of income attained in the previous period to t.

S_t = personal saving in time period t

a and b are constants

Milton Friedman (1957) introduced the concept of permanent income in the consumption function, by attributing household consumption behaviour mainly to permanent income. He approximated permanent income using a weighted average of past and present measured income. The weights were assumed to decrease exponentially. Friedman contended that, measured income composed of permanent and transitory income. He argued that, there was no correlation between permanent income and transitory income and the same case applied to consumption. His consumption-income relationship can be expressed as follows;

$$C_p = kY_p$$

where, C_p = permanent consumption.

Y_p = permanent income

k = constant and is a function of interest rate, net wealth, tastes and preferences.

Ando- Modigliani and Brumberg, (A & M 1960), (M & B 1954) and (A & M 1963) maintained the contention that, people based their consumption expenditure on their life time expected wealth. Consumption was expressed as a function of wealth, where the latter was divided into, non-human physical assets, current level of income and expected future income. The consumption function was thus expressed as follows;

$$C_t = aW_t$$

where, C_t = consumption

a = APC (constant)

W_t = total wealth

Each of the above hypotheses has been criticized in one way or the other. However, basically the difference between these hypotheses is the conceptual nature of income postulated.

2.2 EMPIRICAL LITERATURE REVIEW

Only a few studies have been done in developing countries concerning demand projections

of consumer products. In Kenya

an attempt to make demand projections was made by Massell and Heyer in 1967. However,

their study did not accomplish much because for one the study covered only the middle

income households in Nairobi. Due to different demand patterns in different urban areas and

rural areas, they were not able to make reliable demand projections. They also pointed out

that their demand projections was only an illustration of how such demand projections can

be executed. This study has other weaknesses as is explained later when this particular study

is reviewed. In this section we are going to review a few studies conducted both in developed

and developing countries. Then in the next section we review studies done in Kenya.

Ostby Ivar (1968) sought to make estimates of demand functions in Dar-es-Salaam his

main objective was to give a background for projections of consumers' demand. He used data

for Dar-es-Salaam only, collected by Central Bureau of Statistics in 1965. He made use of

linear functional form on the argument that, since the ranges of the variables involved were

fairly small, then good results would be obtained even if the underlying demand functions

were not strictly linear.

Using regression analysis, he estimated demand functions for a number of commodities.

Among the four explanatory variables used, age and education coefficients were unreliable

for most conditions but the expenditure and family size elasticities were generally more

reliable.

He compared his results with those of Massell B.F. and J. Heyer (the latter conducted

their research in Nairobi)and found that demand patterns were different between the two

towns. He attributed this to geographical, economic, sociological or statistical factors but

made no detailed elaboration. Ostby did not give statistical significance of his findings, moreover, the comparison of his results with that of Massell and Heyer is questionable because, the range of income was totally different in both studies and different functional forms were used by the two authors. His conclusion reveals that,his study was not a serious one because he cautioned that demand projections based on his results should not be taken seriously due to errors in data plus random errors. Moreover, his research covered only 7 pages including reference. The results might have been affected by simultaneous equation bias due to use of ordinary least squares.

Humphrey D. H. and Howard S. Oxley (1976) estimated expenditure and household size elasticities for urban and rural Malawi using the household income and expenditure survey data for urban areas and agricultural estates conducted by the Malawi Government in 1968. They also used the national sample survey of agricultural 1968/69 (NSSA).

For estimating the coefficients they used double log function and divided their study between rural and urban sectors.This was essential because of the differences between the two sectors. With respect to urban areas food, fuel and clothing expenditure were found to increase less than proportionately in response to income and household size increase, dwelling expenses had expenditure elasticities greater than one. Other expenditure group were classified as super-luxuries[7]. Expenditure elasticity for food (.766) was found to be more than the normally assumed one for developing counties (.6) which the authors attributed to the low level of income in Malawi.

The household size elasticity was close to that found by Massell and Heyer for Nairobi

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[7] income elasticities greater than one and household size elasticity negative, the break down of the individual items can be obtained from the results obtained by Humphrey and Howard, Journal of Development studies vol 12 no. 2 pages 256-257.

Kenya. For the rural sector the grouping was different from that of urban sector and so were the results[8]. This meant a direct comparison could not be done and where direct comparison is possible it was found that there was no general correspondence between the two sectors elasticities or rankings.

The elasticity for food in the rural sector was found to be close to that of urban (.706) but the household size elasticity was very high (2.444).

To make demand projections they used very broad categories just like have been done in many other studies. They included total food, clothing and footwear, Beverages and Tobacco, Health, education and house repairs and upkeep. The projection technique used was similar to the illustration made by Massell and Heyer. However, it was evident that the rural and urban sector differences play a significant role in nationwide demand projections and should not be ignored. So the use of estimates based on one urban area or just the urban area can give a misleading picture about the actual demand patterns of the whole country.

They also made a comparison of their study with other east African studies. However, such a comparison was hindered by a number of factors like, different sample size or observations, different estimation techniques and sectors covered. The comparison reveal that no close numerical matching exist between the various estimates for a particular item in different studies but a broadly similar ranking results was obtained by the different studies. In case of household elasticity estimates no general pattern emerge.

This study also used very broad categories in making demand projections moreover, the data used was outdated and no attempt was made to adjust it or to show its validity or its approximate to the situation that prevailed when the study was executed.

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8. Detailed results for the rural sector can be obtained from Humphrey and Howard results in _Journal of development_ vol. 12 no. 2 pages 260-261.

Houthakker H. S. (1957), conducted an international comparison of household expenditure patterns by estimating expenditure and household size elasticities using 40 surveys obtained from 30 counties.

He used the general double log function which he formulated as follows,

$$\log Y_i = \alpha_i + \beta_1 \log X1 + \beta_2 \log X2 + E_i$$

where,

Y_i = expenditure on the i_{th} group of items.

$X1$ = Total expenditure

$X2$ = The family size

E_i = a disturbance term and α_i, β_1 and β^2 are constants to be estimated.

He categorised the commodities into four major groups, namely, food, clothing, housing and miscellaneous. He found that the Engel's law was supported by his findings.

Houthakker argued that, the household size elasticity is composed of the specific effect arising from the increase in the commodities and house hold size increase, and the income effect. The two effects oppose each other such that, if the specific effect is greater than the income effect the coefficients with respect to household size will turn out to be positive Otherwise they will be negative. All the household size elasticities were found to be less than one implying that a proportionate change in household size need not lead to a proportionate increase in expenditure on the specific item. Houthakker attributed this to economies of scale in large families.

The elasticity of the four categories especially with respect to total expenditure were similar, though not equal. The range in case of food was from 0.34 to 0.73. Houthakker

classified clothing as a moderate luxury since most of the expenditure elasticities were greater than one but usually less than 1.5 except for one case where it was less than one. In case of housing most of the expenditure elasticities were less than one which made Houthakker to classify housing as a necessity. He also found that all the expenditure elasticities for miscellaneous category were greater than one.

Elasticities concerning the family size were similar for food and miscellaneous items but irregular for clothing and housing. The term similar was used to imply that the estimates fell in a fairly narrow range differing merely by sampling deviations from a common true value. Houthakker concluded that in case of lack of data on expenditure patterns of a country, one can be within reasonable range if he use incase of total expenditure 0.6, 1.2 for clothing, 0.8 for housing and 1.6 for all other items grouped together. With respect to household size Houthakker recommended the us of 0.3 for food, zero for housing and -0.4 for miscellaneous expenditure. One should be careful when applying such results since they were recommended on the basis of the results of Houthakker's study and great variations may be experienced with different studies. Moreover, Houthakker's study had several weaknesses as is explained below.

The study utilised surveys which were collected in different periods and the range varied from 1853 in case of the Survey collected in Belgium to 1955 in the case of the Surveys collected in Sweden, Japan, Kumasi and Secondi-Takoradi. Another weakness of Houthakker's study is that, the sample ranges were very different, the range being from 35 for Libya to 21,964 for Japan. Like other authors, he used very broad category classifications and the data he used was biased in several ways and no attempt was made to correct the biases. Ivar Ostby and Taye Gulilat (1969), used the household expenditure survey of Addis Ababa executed by the central statistical office in June 1968. The data covered only

249 households. Their objective was to find the determinants of expenditure pattern in Ethiopia and they used regression analysis and sought to establish the relationship between the individual item household expenditure and age of the head of the household in years, literacy of the head of the household, household size, home ownership and household total expenditure.

Their main objective was to fill the information gap that existed on the pattern and determinants of household expenditure in Ethiopia. They argued that such information could be used in demand projections in Addis-Ababa. However, they never made any attempt to make such demand projections.

In their study they used twenty commodity groups. Since measured income fail to match with the economic concept of income, they concluded that they were justified to use expenditure as an approximation to income. This has been the procedure followed by most studies that have executed and analyzed consumer behaviour both in developed and developing counties. They used the linear and double log functions. However, their use of OLS might have resulted to errors, and thus to inconsistent estimates.

With respect to the linear function, average expenditure elasticities and marginal propensity to spend were all positive indicating that all commodity groups considered were "normal". Five categories were found to be elastic with respect to total expenditure.

All marginal propensity to spend were significantly greater than zero but for one category (total pulses). They were surprised that total services and clothing were not elastic with increasing total expenditure, which they argued might be a sign that the linear function did not fit the data well. The average expenditure elasticity for total food was 0.609 which was close to what Houthakker postulated in the case of unreliable data and in fact obtained by

most studies[9]. However, in case of clothing and housing, the average elasticity differed from those obtained by other studies. the specific elasticities were 0.513 for rent (housing) and 0.841 for clothing, respectively. They found the marginal propensity to spend was 0.261. The age variable was only significant in three out of the twenty cases and for rent it was negative. Education affected stimulants negatively and significantly, while it affected bread positively, it was insignificant in all other categories. Household size affected significantly and positively four out of the twenty cases and one case negatively. Ownership affected significantly and positively four out of the twenty cases. Total expenditure was significant and positive in all but one case total pulses. The coefficient of determination range was between 49-95, which they considered to be quite high. However high coefficients of determination and T-ratios could be an indication of multicollinearity which they do not seem to have considered.

With respect to the double log function, zero expenditure limited the number of categories, hence very broad classifications were used (eight).

Total services and total clothing categories estimates were found to be significantly larger than the one obtained using linear function and they were elastic while the other commodity groups were inelastic with the value of sugar being 0.943 and that for total cereals 0.389, respectively. The double log function fitted the data better than the linear function, which is in line with other studies that have used the latter function. Education and household ownership were omitted. Age was not significant in all categories estimates. Household size was negative and significant in one case (total services). Total expenditure was significant in all categories estimates. Total food expenditure elasticity was found to be 0.768 which was not far from what other studies have found. The coefficient of determination range was

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[9] See Okunade A. Ade Engel curves for developing nations. The case of Africa. East African Economic Review new series vol 1 no.1 December 1985. plus other studies the list of which can be obtained from the bibliography.

0.671-0.996 for the double log function.

The weakness of the research are that, one ,like other studies they used very broad categories. Secondly, the data used covered only one urban centre and the sample size was too small (179) for any relevant national policy and nationwide demand projections. Thirdly, OLS method was used which mean simultaneous equation bias might have resulted. Fourthly, no demand projections were conducted.Finally the analysis seemed not to be consistent for example, considering literacy its effect on Berebere, spices and salt, total services, vegetables and fruit they are neither significant at 5% nor at 10%. as the they claim. (This is evident from the results they give)

Barten A.P. (1968) using a system of linearized "composite" demand equations and under conditions of want independence, estimated price and income elasticities for food, pleasure goods, durable and remainder, using Netherlands data for the periods 1922-1939 and 1949-1963. Considering elasticities for selected years, he concluded that, durable goods were luxuries. The income elasticities for food were below one revealing that the, Engles law held true. Pleasure goods were classified as mixi-luxuries while the elasticity of the miscellaneous category were considerably below one. The latter category included public utilities, rent and services and appeared to be more necessary than food. Barten recommended a desegregation of the commodities in order to get a clear picture of the results in the case of the miscellaneous category.

Price elasticities for all category groups were within the range of 0 and -1 which implied that all the commodity groups were demand inelastic. The author attributed this results to the broad commodity classification. While durable goods dominated, the direct price elasticities for the other groups are almost the same.

Barten also estimated the covariance matrix of the stochastic components. The results were

that, but for the covariance between food and pleasure goods, all covariance were negative. To obtained a clear picture, Barten calculated the correlation coefficient and found out that, half of them were greater than 0.4 in absolute terms, which implied that, the covariance of the disturbance terms of demand equations for different commodities should not be ignored. The sign of the covariance between food and pleasure goods was not in line with theoretical covariance though its size was small.

Barten found out that random fluctuations were relatively important for food than for durable goods. He concluded that, save for food, income and price changes were important in explaining consumer behaviour. He argued that further investigation was in order in case of food. One of the weaknesses of Barten's study is that the inclusion of stochastic variables though important reduced the possibility of precision in predicting,

In another research Barten (1964) used data for the periods 1921-1939 and 1948-1958. He found a clear pattern on food and durable, such that food was found to be income inelastic while durable were income elastic which was in conformity with other studies.

Both of the above studies conducted by Barten used very broad category classifications which is a weakness shared by many studies.

2.3 REVIEWED LITERATURE BASED ON THE KENYAN ECONOMY

Howe w. c. (1965) in his study "An analysis of African household consumption and behaviour in Kenya and Uganda" used a number of functional forms for his study to calculate expenditure elasticities only.

His analysis is questionable because like Ostby[10] he did not indicate the significance of his results and the sample size was small. Moreover, the data he used was obtained during the colonial period and in the case of urban areas it could not be considered as a representative one. The data covered only small parts of the two counties namely only Nairobi for Kenya and Kampala for Uganda. For the rural data he argues that the regions covered were similar in many respects.

Howe found out that Alcoholic beverages and tobacco, clothing, household goods and school fees were under the category of luxuries since their coefficients (i:e expenditure elasticities) were greater than one. However, the range within which they fell varied. He also noted that necessities were dependent on income and while some commodities like meat and fish displayed themselves as necessities in some regions and in certain income groups they emerged as luxuries in others. Howe argued that the wide range of elasticities of meat and fish should be due to income and the protein content of the basic diet in different regions.

The use of a number of functional forms make it difficult to compare his results because different results are expected when different functional forms are used even if the same data is used. Moreover, the failure to state the significance of his results make it even more difficult for such a comparison. In his conclusion he regarded the empirical evidence sketchy showing that he was not serious. He concluded that consumption patterns differ

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[10] Here reference is being made of Ostby's study in Dar-es-Salaam in "A statistical study of demand patterns in Dar-es-salaam preliminary review" university college Dar-es-salaam ERB paper 68.5.

greatly among different E.A groups and cautions against application of results from one area to the projections of consumption demands in another. However he did not make any attempt to project future demand patterns.

Otundo (1984) was interested in investigating aspects of the dualism between the rural and urban areas. She thus set to find out the nature of the hypotheses that, The marginal propensity to save for rural sector was lower than that of urban sector and for food the marginal budget share is higher than that for non-food in the rural areas while the opposite held true for the urban sector with respect to food and non-food commodities.

Otundo used secondary data collected by the Central Bureau of Statistics, the urban food purchasing survey data (UFPS) corrected in 1977 which she obtained from Jan Vandamoortele and the integrated rural survey data (IRS1) corrected in 1974. Using linear expenditure system in case of urban and extended linear expenditure system, Otundo found that the estimated coefficients (mpcs) were significant at 5% level but were small numerically. She attributed the small size of the estimates to the ignorance of subsistence value of rural households which is a major characteristic of the rural sector. She also argued that interest rates facing rural households is higher than that met in urban sector and hence the need to save higher proportions of income to finance the loans and such interest rates on loans. MPC and income were found to be inversely related especially in the case of food. She found aggregate mpc of 0.542 for the rural sector as a whole. But for the coast province, the marginal propensity to spend (MPS) for non-food was lower than the MPS for food in the entire rural area. However, considering the entire rural sector the MPC for non-food was smaller than that for food. The hypothesis she had set, that marginal budget share for non-food is lower than for food did not hold true for all provinces save coast province. However, the hypothesis held true when all the provinces were considered.

The coefficient of determination (R^2) for food ranged from 0.079 central province to 0.961 for western province, while that for non-food was 0.076 for coast to 1 for western. However, the value of R^2 for food was very low 0.014 but considerably high for non-food commodity group. The aggregation of all provinces and all commodity groups gave an R^2 of 0.531. It should be realised that a very high R^2 could be a sign of multicollinearity which Otundo does not talk about and which Jan vandarmoortele and Roldof argue might have affected their study.

With reference to urban results and save for education for the poor and middle class, transport for all classes and services for the poor and middle class, all the MPCS were significant at 5% level but like in the rural area were very low. However the MPC for eggs was high in all classes. The MPC for the whole urban sector was 0.662. The MPC for food and aggregate MPC were found to be inversely related to income. She also found out that, the marginal budget share for non-food was lower than that for food. This results contradicted the hypothesis she had set that, the marginal budget share for food was lower than for non-food.

Although the R^2 values for food were higher than those for non-food, generally all R^2 values were low. The range was between -0.001 for education of the poor and 0.93 for education of the rich. Otundo's urban results were similar to those obtained by Jan Vandamoortele.

In conclusion, Otundo pointed out that income was the major factor determining consumption expenditure and redistribution policy should take into account the effects of increase in income on expenditure with respect to food and non-foods. She argued that as income increases more expenditure will be directed to non-food items and that, unless the industrialists responded by increasing production more foreign exchange will continuously be

spent on imports of such non-food commodities resulting to constraints on foreign exchange.

Though implicitly, Otundo revealed that, some kind of dualism existed in the urban sector where pockets of poverty co-existed with wealthy people. In fact some of the urban residents are poorer than some of the rural folks. She also noticed that the rural sector can be a source of development resources more than the urban sector since the proportion of savings was higher in the former sector. This is in contrast to the reasons given by Jan vandarmootele that such savings denote delayed consumption.

Though Otundo never concerned herself in elasticities her research is of interest in that, it emphasise the difference between rural and urban areas, and as noted by other authors such a difference is important when making demand projections. However, Otundo like most other researchers used very broad categories of commodities and although it fitted her case we tend to think that, it would be better if it was a bit desegregated. Otundo did not seem to be clear with the methodology she used because she claimed to have used ELES and in fact argue that Jan Vandemortele used the same methodology, but the latter used LES. Moreover, it is clear that Otundo used LES with respect to urban areas. Due to this inconsistency and the fact that for rural areas she used income while for urban areas she used total expenditure, the comparison between rural and urban sectors is questionable. The data Otundo used in her analysis for urban sector covered only four urban centres and as such cannot be considered representative of the urban sector as a whole. The current study will utilise data covering about 90% of the total urban population[11].

Jan Vandemoortele and Rolph Van Der Hoeven (1982) used the same surveys Otundo used (i:e the Urban Food Purchasing Survey (UFPS) carried out in 1977 and the Integrated

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[11] Refer to central bureau of statistics ministry of planning and national development. urban household budget survey 1982/83 document. Government printer Nairobi.

Rural Survey one (IRS1) data executed in 1974). They were interested in finding the major determinants of income and its distribution in Kenya.In particular, they wanted to find out the value of minimum requirements as taken by households, the way households allocate expenditure both on the average and at the margin, the way expenditure on individuals commodities respond to changes in total household expenditure and how food price changes among other prices affect the allocation of total household consumption.

With respect to urban households they found a direct relationship between income and household size. On average the household size was 6.28 for rich households and 5.25 for poor families.They also found a direct relationship between average expenditure per capital and per capital income and an indirect relationship between average propensity to consume and income and the same relationship held when one considered the occupational status and the level of education. There was a negative correlation between average household size and education attainment.

With respect to rural sector, the average urban household size was found to be lower than that of rural sector, 5.61 for urban and 7 for rural areas. The relationship between average household size and income was similar to that found in the urban areas though the values were different. The respective figures were 5.25 for the poor households and 9.57 for the rich households. They found out that there was a direct correlation between the educational level of the head of the households and household size. While poor families were net borrowers, wealthy families saved up to 38% of their income.

Rural households allocated more of their income to food than the urban households. The respective average food budget shares for rural and urban sectors were 78.3 for rural and 49.5 for urban, respectively. However, rural households spend less on manufactured commodities than did urban households, but the urban and rural households expenditure on

transport were similar. Like Otundo, they found out that rural households saved a larger proportion of their income than did the urban households. However, contrary to the reasons given by Otundo, that savings were necessary for the payment of loans and the higher interest rates in the rural areas, Vandamoortele and his colleague argued that, savings were necessary for future consumption, (that is savings reflected postponement of subsistence consumption rather than future consumption of luxury commodities.)

The Engels law was found to hold both for the rural and urban households with average values of 0.63 for urban and 0.67 for rural areas. The other commodity classifications were found to have expenditure elasticities greater than one particularly for urban households. They noted that, expenditure patterns between different groups varied both within urban and rural areas. The rich households were found to spend about half of what poor households spend, but the poor households expenditure on transport and services were significantly below the expenditure of the rich households. The LES was found to fit the data well since half of the Engel curves had an adjusted R^2 above 0.3 while 40% had an adjusted R^2 over 0.5.

The expenditure on basic necessities, especially food and housing was found to be higher among the poor households and while expenditure on clothing, education and transport was low for poor households, it was important for the rich households. Aggregate MPC for poor households was about 1 while it was about 0.53 for the rich people.

The gap between the poor and the rich was lower in the rural sector than in the urban. Vandamoortele and Hoeven made the following general conclusions. That on average, food budget share was directly related to income and education and was lower for urban than for rural families. Average marginal budget shares for clothing was higher for rural families and there was a positive relationship between it and income. Average MBS for manufacture was less correlated with income and was about 4 times higher for urban households.

Price elasticities were negative and seemed to be directly related to income especially for rural households. Food cross-price elasticities were inversely related to income and educational level. They also concluded that but for income, other factors especially location, the education level, occupational and household size were important in determining consumption patterns.

However, they agree that the results could have greatly been influenced by the partitioning of household population and by the commodity classification. Moreover, they pointed out that multicollinearity could have also affected their findings Like other researchers Vandenoortele and Hoeven used very broad category classification. For example, he had such categories as food and non-food and just like in the case of Otundo the sample size cannot be considered representative in the case of urban areas.

Massell B. F. and Judith Heyer (1967), applied two functions, the double log and the ratio semi-log to household budget survey data of African middle income workers in Nairobi with the intention of finding the relationship between expenditure on the jth commodity of each of the 26 commodity groups and total household expenditure, household size, pay day, land ownership, level of education and whether housing is provided by the employer.

They found that the coefficient of determination ranged from 0.006, (school fees) to 0.658 (total food) using analysis of variance (Anova) 21 and 2 of the regressions were significant at 1% and 5% level of significant, respectively. The low values of coefficients of determination was attributed to grouping using the instrumental variable.

Total expenditure was significant in 14 and 4 cases at 1% and 5% level, respectively. The expenditure elasticity for maize was negative and thus it was classified as an inferior good. Non-food items had higher expenditure elasticises than food. But for school fees, fuel and household operation, all other non-food items were classified as luxuries.

With respect to household size elasticity, 16 of the items were significant at 5%. The household size elasticity for total food was found to be low which was attributed to substitution of cheaper for more expensive food stuffs, hence decreasing food expenditure per consumer unit.

They concluded that using double log function, expenditure and household size are significant in explaining inter-household variation in most individual expenditure items. Pay day, land and education have insignificant effect, and but for education, this insignificance is probably due to multicollinearity. It was evident that the double log function gave a better fit than the ratio semi-log function although the estimates were found to be similar when considering both functions.

Massell and Heyer made an attempt to make demand projections for Kenya using the results they obtained. However; they only succeeded in illustrating how such a projection can be done because their research suffered from many weaknesses. The data they used covered only middle income group in Nairobi. Thus ignoring other income groups and urban centres in the country. To that effect they could not make reliable demand projections and in fact pointed out that, their demand projections was only an illustration.

Okunade Albert Ade (1985), was interested in estimating Engel curves for developing countries by considering Africa as a case study. He used a number of functional forms, namely the strictly linear function, the linear-log function the log-linear and the double log function.

Using log linear and data covering Nairobi area, the income elasticity on food consumption expenditure was found to be 0.17 while using a linear function and data for Mombasa it was 52.26. But for Kenya-Mombasa, Tanzania mainland and urban areas, all the coefficients were less than one as one would expect with respect to food expenditure.

The value of R^2 were considerably high ranging from 66.77% for Uganda-Kampala to 99.29 for Sudan-urban. The Engel law held true for food while clothing and housing emerged as luxuries. 20% of the elasticities of food products were between 0.5 and 0.7 while 65% had elasticities less than one. He also found out that expenditure elasticities for most urban centres were about 0.9. On average food elasticity was 0.57 which was close that suggested in case of unreliable data. The elasticity of clothing was on average that hypothesised by Houthakker although there was no conformity with the findings of most studies when housing was considered since more than 85% of the budget sample was found to be elastic. Housing was classified under luxury and the author said the reason behind it could be debated upon.

Okunade generally concluded that his findings for each of the commodity groups were in line with the findings by Houthakker and other authors save for housing expenditure. But for countries with data problems, the income elasticity for most countries were found to be similar. Okunade study had several weaknesses. For one only one explanatory variable was included mainly due to data problem. Secondly the study considered only small sections of the countries taken into account. Finally no unification of functional forms was used and comparison of the results with those of other studies is actually difficult.

2.4 OVERVIEW LITERATURE

Almost all the studies reviewed both in developed and developing countries have used very broad commodity categories, for instance; Humphrey and Howard estimated expenditure elasticities on the basis of which they made demand projections. However; they conducted demand projections for only six broad category groups namely; total food, clothing and foot wear, beverages and tobacco, health, education and house repairs and upkeep. Considering total food it comprises of very many items and for planning purposes it might not be clear

what particular item to lay emphasis on. This is so because different commodities have different growth rates. The aim of this paper is to overcome this weakness of other studies by using a detailed breakdown of commodities in the demand projections.

All the studies reviewed above have used aggregated commodity and or aggregated consumers. As has been noted by several authors, aggregation can introduce an aggregation bias in the estimates. This study have used desegregated commodity and individual data to avoid problems of aggregation and the above mentioned biases.

CHAPTER THREE

METHODOLOGY

3.1 THEORETICAL FRAMEWORK

Consumer behaviour is one of the oldest areas of study in economics. The first empirical attempt was made in 1699 in Devenant work where a demand schedule for wheat was given, which had been derived by King G. three years earlier[12].

Theoretically consumers are assumed to maximize their utility subject to their budget constraint. The individuals preference function can generally be given as follows,

$$U = U(q)$$

where,   U = utility derived from consumption of commodities q.

q = is a vector of quantities of commodities within the feasible set of an individual.

The preference concept is subject to a number of assumptions given the rational behaviour of an individual.

first the commodities are assumed to be infinitely divisible such that, comparability of different bundles of commodities is only the relevant factor to an individual. So the following is expected to hold.

Given two commodities (or bundles of goods) x_1 and x_2 then, x_1 is preferred to x_2, x_2 is preferred to x_1 or x_1 is equal to x_2.

The assumption of transitivity postulates that, given three bundles of goods x_1, x_2, and x_3 then, if x_1 is at least as good as x_2, and x_2 is at least as good as x_3, then, x_1 is at least as good as x_3 and at least as good as itself. The last condition is the assumption of reflexibility.

The other assumption is that there is continuity so that lecographic situations are ruled out.

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12. Deaton A. and Brown A. models of consumer behaviour: Economic Journal vol 82 page 1146.

The utility function is assumed to be ordinal in the sense that it can be superseded by any strictly increasing transformation of itself.

The consumers are assumed to prefer more to less and their utility function is assumed to be strictly convex and at least twice differentiable.

Given the above assumption, the individual utility maximization problem can be expressed as follows,

maximize $U = U(q)$...................1

subject to $pq = Y$ 2

where, Y = money income of the individual.

p = a vector of prices

q = a vector of quantities.

Utilising the concept of a lagrangean multiplier the maximization problem can be expressed as follows,

$L = U(q) + z(Y - pq)$....................3

where, z = is the multiplier representing marginal utility of money.

Differentiating the above equation and using the partial derivatives and the constraint to eliminate the multiplier, we get a series of demand equations of the general form,

$q = f(Y,p)$...........................4

i:e the quantity demanded of a certain commodity is a function of the level of income and prices[13].

In cross-section analysis the prices facing all consumers are the same and hence drop out of the demand equation.

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[13]. i:e its own price and prices of other commodities.

, The assumptions outlined above implies that, the demand equations have the following properties.

The demand function are homogenous of degree zero in price and income, which implies that, people do not suffer from money illusion.

The second property is that the summation of individual commodities expenditure must equal total expenditure.

$$\text{i:e } \Sigma p_j x_j = Y$$

The third property is that, the substitution effect must always be negative showing that an increase in price of a certain commodity will lead to a decrease in the quantity of that commodity.

The fourth property is that there is symmetrical cross effects or rather the substitution effect of commodity x is equal to that of another commodity y as a result of changes in the price of commodities y and x, respectively.

There are two other assumptions added to the above. the assumption of separability and additivity.

The former refer to groups of commodities while the latter refer to individual commodities and implies that the marginal utility of each commodity is independent of the quantities of any other commodities consumed.

However, in practice the choice of a demand model depend on a number of factors like, data base and ease of application among other factors.

Hardly are demand models derived from utility functions. Moreover, the demand functions explained above are individual demand functions for individual commodities and problems of aggregation between commodities and across consumers usually crop up.

The models used in practice are stated directly and may satiate some of the conditions of

the individual demand functions. So models are used for all sort of reasons.

In demand analysis the following models predominate, The Linear Expenditure, the Add-log, The Rotterdam, and the log- linear. Each of these models has its own weaknesses and advantages.

Several authors have attempted to make a comparative analysis of the different models and the results have been almost similar.

Such a comparison was done by Deaton (1972) using United Kingdom data for the period 1900-1970[14].

He found out that it was, for example, difficult to determine which among Log Linear and Linear Expenditure System suitably represent consumer behaviour for it was not possible to define them in a single model and then determine their validity.

It is argued in, Mayers[15] that, the alternative methods could give rise to inconclusive results.

The main conclusion of Deaton is that, ''The selection of an optimal model depends on the use to which it is to be put and on the circumstances surrounding its estimation''[16].

It has been pointed out by Deaton and Brown Alan[17] that there is a trade off in choosing one functional form instead of another.

14. Deaton A. The analysis of consumer demand in the United KingDom 1900-1970 Econometrica vol 42 pages 341-367.

15 Mayers D. G. Application of Econometrics. Prentice-Hall INC London 1981 page 319.

16. Deaton A. S. The analysis of consumer demand in the United Kingdom, 1900-1970. Econometrica vol 42 no. 2 March 1974 page 366.

17. Deaton A. S. and Brown Alan Surveys in applied Economics: Models of consumer behaviour Economic Journal vol 82 September 1972. page 1151.

3.2 CHOICE OF THE MODEL

Generally there in no economic theoretical base for choosing a functional form or a model to estimate an economic relationship. Economic theory in particular, does not give the procedure for choosing a functional or a system of functions that can be used to estimate demand relationships. However, the choice of a functional form for the relation between dependent variable and the explanatory variables, is very important. However, there is no a-priori method of choosing any of the many functional forms in existence, as explained above. The functional form chosen will highly influence the calculated parameters (like the expenditure and other elasticities[18]) . Several functional forms have been used in the estimation of expenditure and household size elasticities There is usually a trade off between the choice of one form and another as already explained above. For example, theoretical considerations might favour the polynomial functional forms because of their additivity satiation condition[19]. But polynomial functional forms do not meet the essential non-negativity of consumption assumption[20]. This weakness is not shared by some functions, for instance, the logarithmic functions, which are usually implausible because of not meeting the additivity property. The polynomial regressions face yet another weakness in that, if the range of observations is not much larger than is usually the case in budget surveys, the sampling covariance of the regression coefficients is often high as a variable and its square

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[18]. Houthakker H. S. An international comparison of household expenditure patterns. Commemorating the centenary of Engel's law <u>Econometrica vol 25 1957 page 539.</u>

[19]. Nicholson J. L. ''variations in working class family expenditure'' <u>Journal of royal statistical society, series A, vol cxII 1949.</u>

[20]. Houthakker H. S. ''The econometrics of family budgets'' <u>Journal of statistical society series A, vol cxv 1952 page 5</u>

will then be highly interconnected[21]

Considering the above, among other factors, in this study, the double log function will be used. this function has the following advantages; it is simple and easy to work with, it has been widely used in several studies and found to have a

good fit[22] and it has an automatic correction for heteroscedasticity. The double log function will give expenditure elasticities directly which we require for the calculation of demand projections and other necessary values. The double log function assumes constant elasticity, but this defect has been shown to be numerically of minor importance[23]. Moreover, the good fit associated with this functional form tends to overshadow its weaknesses.

3.3 MODEL SPECIFICATION

The functional form used in this study is the double log function which is formulated as follows,

$$Y_j = aX^{bj}H^{cj}E_d{}^d RE^e e^{Uj}$$

Taking the natural logarithms we get,

$$LogY_j = a + bLogX_j + c\,LogH_j + dlogE_d + elogRE + U_j$$

where, Y_j = the expenditure on the jth commodity

X_j = total expenditure

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[21] ibid.

[22]. Refer to Massell B. F. and Heyer J. Household expenditure in Nairobi. A statistical Analysis of consumer behaviour. Economic Development and Cultural Change. vol 17.

[23]. Houthakker H. S. An international comparison of household expenditure pattern. Commemorating the centenary of Engel's law. Econometrica vol 25 1957 page 543.

Hj = the household size[24]

Ed = level of education of the head of the household

RE = Years of urban residence

Uj = a random variable representing all other variables and errors in the equation.

a, b, c, d, and e are coefficients to be estimated. where b and c are expenditure and household size elasticities, respectively.

3.4 JUSTIFICATION OF VARIABLES

Income is the major determinant of consumer demand and all studies which have been done, both in developed and developing countries, generally support the Engels law. Most of the studies executed in developing countries have tended to concentrate on only two variables, expenditure and household size. The argument is that, studies that have employed other factors or variables have found them to be insignificant. In the current study a number of variables will be considered because although Massell and Heyer found that all the variables they used except for total expenditure and household size were insignificant[25], their study not only covered Nairobi area, but also only the African middle income workers. The data they used was taken during the colonial era and from then more than three decades have elapsed. So we would expect the level of education as well as other factors to be significant because during the time Massell and Heyer executed their study the level of education was very low in Kenya, in comparison to the current situation. Moreover, we will use a larger

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[24]. Total household size i:e Adults plus children.

[25]. Refer to Massell and Heyer study, Household expenditure in Nairobi. A statistical analysis of consumer behaviour. Economic development and cultural change vol 17.

data base than that used by Massell and Heyer. Humphrey and Howard excluded other variables other than expenditure and household size, on the understanding that other variables had been shown to be insignificant by Massell and Heyer. Considering the above mentioned weaknesses of the latter study, then Humphrey and Howard are not justified in excluding other variables. further more, different commodities are influenced differently by different factors.

3.5 EXPECTED SIGNS

Consumer behaviour is highly unpredictable. However, generalisations can be made. Assuming the commodities studied to be "normal goods" we expect a positive expenditure elasticity for all the commodities. For food commodities the expenditure elasticities are expected to be less than one as well as positive while they are expected to be positive but greater than one for luxuries. It should be noted here that it is hard to determine a priori which commodities are necessities and which are luxuries since what is a luxury to one group of people may be a necessity to another group. This implies that the income group that dominate might highly influence the results obtained .

The signs and magnitudes of household size elasticities and for the other variables can be varied depending on the nature of the commodity in question and relationship with each of the attributes or characteristics of the household. However, generally we expect a proportionate increase in household size to produce a proportionate increase in expenditure on food products. A proportionate increase in income is expected to produce a less then proportionate increase in expenditure on food and the same effect is expected with respect to education level increase. However these general expectations can be varied for different commodities.

3.6 ESTIMATION TECHNIQUE.

There are generally two methods of estimation, the Orthodox approach where the researcher chooses a functional form and then goes ahead to estimate it and the experimental approach in which case the researcher conduct an experiment over a number of functions until the one which seem to fit the data best is chosen.

Theoretical considerations may give a guide to the appropriate estimation of an economic relationship. However, the most appropriate estimation technique as dictated by theory may not be employed due to non-availability of data among other problems (See for example Koutsiyiannis Theory of Econometrics MacMillian Education Limited 1977 pages 21). In such a situation one is left with no option but to use a less desirable econometric technique which may introduce bias into the estimates lender-ring such estimates to be handled with care. It is also necessary that in estimation of demand functions a complete simultaneous equation model be used. such a model should involve demand equations, supply equations, price equations ex-cetera. But due to lack of data such an econometric evaluations is hindered and simple methods of estimation are usually used.

The use of Ordinary Least Squares may result into simultaneous equations bias, which may be as large as 50%[26]. Humphrey and Howard (1976) showed that although the bias rarely exceeded 5% for urban areas, it was as high as 20-25% for rural areas in some cases[27]. To overcome the simultaneous equations bias, the Two Stage Least Squares technique need

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[26]. Ibid page 217.
      Also refer to, Summers R. ``A note on least squares
      bias in household expenditure analysis'' Econometrica
      vol 27 Jan. 1959.

[27]. Humphrey and Howard Expenditure and household size
      elasticities in Malawi: Urban-rural comparisons.
      Demand projections and a summary of East African
      Findings. Journal of development studies vol 12 NO. 2
      page 254.

to be used through the use of income as an instrumental variable.   Under such conditions,

consistent estimates will be obtained despite the fact that measurement of income is always

error prone. However, the non-availability of income data limit the use of such a method in

this study. So Ordinary Least Squares (OLS) estimation technic was employed and all the

assumption of OLS were thus assumed to hold.

3.7 METHODOLOGY AND DATA

In this study secondary data obtained mainly from Central Bureau of Statistics was made

use of. The data used in calculating the expenditure elasticities was collected in the 1982/83

urban household budget survey which is the most recent survey of this kind in Kenya.

The survey covered about 2 million urban population which was approximately 86% of

the whole urban population. So the survey can be regarded as National Urban Survey. The

survey not only covered a larger number of households than previous surveys but contained

more details about households characteristics and consumption behaviour.

The major objectives of the survey, are as out lined in the Urban Household Budget

Survey publication by the Central bureau of Statistics 1990[28] included, the need to provide

information on demographic and household characteristics, to provide data enabling a more

accurate calculation of urban retail price indexes, to provide information on the relationship

between expenditure levels and household size, to provide data that could enable the

derivation of consumption patterns by various characteristics in several urban centres and to

give data that could allow comparison of income levels and expenditure in a number of

characteristics and urban areas.

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[28]   Government of Kenya Urban Household Budget Survey,
       1982/83 Central Bureau of Statistics, Ministry of
       Planning and National Development 1990.

The survey data was collected following the expenditure approach and hence total expenditure rather than income was the value considered. This procedure was followed to avoid problems associated with collection on income data. This implies that the current study has been restricted to the use of total expenditure as a proxy for total income not only because of the fact that the conceptual value of income hardly coincide with measured income, but also because of non availability of data on households income.

Lack of income data also hindered the use of two stage least squares and as such simultaneous equation bias may be present in the estimates. However, although Massell and Heyer has shown that such bias can be as high as 50%, Humphrey and Howard found it to be about 5% in urban Malawi and between 20% and 25% in rural Malawi. It is here assumed that the bias will not be serious since little can be done to minimize its occurrence.

The data obtained from Central Bureau of Statistics covered 2040 households from all the urban areas surveyed. The data covered all income groups with a bias on lower income group which comprised majority of the households[29]. All the households for which information on household size was not available were eliminated. This procedure eliminated 154 such households leaving 1886 households for sampling.

1886 households was quite a large number and one might feel that it would have been better if the households were further reduced through grouping. The work load involved in handling such data can be strenuous and time consuming. However, in this study classification of the data was avoided for various reasons. First it is apparent in most studies that classification is mainly used to reduce the work load (by reducing the number of observations) and/or to eliminate or reduce the number of gaps where some households have zero expenditure. Grouping is also used to reduce the cost of operation and time especially

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[29] See table 2.

where computer facilities and other necessary facilities are limited. Humhprey and Howard[30] pointed out that classification and partitioning of their data by income groups could have been responsible for the rather too high values of coefficient of determination and T-ratios which implies that the estimates were biased. A similar observation was also made by Vandarmoortele Jan.

Due to the above reasons no classification was attempted in this study. Since double log function was used it, was necessary to cater for non-expenditure where any was present because taking the logarithm of a zero is not possible. To overcome this problem it is usually argued that a small value can be introduced especially where the gaps are not many. This procedure was followed here and a value equal to 0.000001 was inserted in every place where a gap existed while commodities with too many gaps were left out.

Data on several commodities especially household goods was not available. This has limited us to the analysis of only a few consumer products a great number of which are food products. The commodity for which data was also scanty were not considered. This further reduced the list of the commodities considered.

Due to non-availability of data the calculation of implications of growth rates of imports was greatly hindered as is explained in a latter section. Some of the data used in making demand projections and other necessary calculations was obtained from several sources. The major sources were the Statistical Abstracts, Economic Surveys Development Plans and other Government publications like the Technical papers obtained from Long-Range Planning division in the Ministry of Planning and National Development.

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[30] Humphrey D.H. and Howard S. O Expenditure and household-size elasticities in Malawi :Urban-Rural comparisons, demand projections and a summary of East African Findings. Journal of development studies vol 12 No.2 1976 page 254.

CHAPTER FOUR.

ESTIMATES AND ANALYSIS OF RESULTS.

In this chapter details of the results obtained and their analysis are given.

TABLE 3. THE REGRESSION RESULT.

	EXPED ELAST	HHS ELAST	EDUCA ELAST	URBAN ELAST	R^2
Sugar (Refined sugar)	1.202 (.076)	.505 (.113)	-.006 (.014)	-.007 (.021)	.174
Rice	.923 (.061)	-.142 (.090)	-.006 (.011)	-.015 (.017)	.197
Wheat Flour	2.361 (.131)	.871 (.197)	.107 (.024)	.048 (.037)	.229
Bread	.995 (.06)	-.138 (.088)	.028 (.011)	.007 (.017)	.151
Packet Milk	.929 (.082)	-.192 (.121)	.058 (.015)	.012 (.023)	.261
Charcoal	2.24 (.148)	.743 (.219)	.023 (.027)	-.011 (.041)	.209
Eggs	2.002 (.120)	-.273 (.176)	.104 (.022)	-.077 (.034)	.203

Table 3   contine   d

	EXPED ELAST	HHS ELAST	EDUCA ELAST	URBAN ELAST	R^2
Fat (Kimbo & (cowboy)	1.265 (.094)	.193 (.139)	-.037 (.017)	-.033 (.026)	.119
Beef	1.018 (.073)	-.233 (.107)	.022 (.013)	-.031 (.020)	.123
Dry Beans	1.455 (.127)	.722 (.188)	-.094 (.023)	.058 (.036)	.123
Maize Grain	.739 (.148)	1.004 (.218)	-.051 (.027)	.069 (.041)	.094
Maize Flour	.972 (.078)	-.217 (.115)	.007 (.014)	-.004 (.022)	.257
Fare	2.619 (.151)	-.766 (.224)	.027 (.028)	-.001 (.042)	.186
English potatoes	2.011 (.128)	.576 (.190)	.059 (.023)	.030 (.036)	.229
Total food	.641 (.014)	.156 (.020)	-.004 (.003)	.008 (.004)	.600
clothing	3.51 (1.038)	-0.138 (.232)	0.068 (.029)	-0.063 (1.43)	0.239

Source: The table was compiled from the regression results obtained by the author. (see appendix 3 for the specific regression equations and further details of results)

The regression results of the commodities chosen are shown in table 3 above. The problem of auto-correlation was identified in all the regressions and corrected using the first order auto regressive correction method. The figures represent the partial elasticities with their standard errors in brackets. The first column headed "exped elast" represent the expenditure elasticities. This is followed by household size elasticities in the second column, while the third column represent education of the head of the household elasticities. The years of urban resident elasticities are shown in the last but one column. The coefficient of determination (R^2) figures are shown in the last column.

All the expenditure elasticities are significant at the 5% level indicating that total expenditure and hence income is significant in determining consumer demand pattern.

Refined sugar, dry beans, eggs, fats, beef, english potatoes, charcoal, fares, wheat flour and clothing can be classified under the category of luxuries since their expenditure elasticities are greater than one. The rest of the commodities are under the category of necessities. however, there elasticities are also high save for total food and maize grain.

The results with respect to food products under the category of luxuries is rather surprising. Generally, foodstuffs are expected to fall under the necessity category. but the high expenditure elasticities probably reflect the nature of the data. The data was collected in 1982/83 when there was a worldwide recession and the rate of inflation was the highest ever in Kenya (23%). Moreover, the data covered more lower income group households than the other income groups as is evident from table 2 in appendix 2. As such it appear that most of the households during this period (i:e 1982/83) found it hard to cope with the rapid rate of inflation and as such most of the commodities were perceived as luxuries, even where such commodities happened to be foodstuffs. Considering the fact that a large proportion of the commodities like sugar, wheat, rice and beef are imported or are generally expensive

domestically, it should not be surprising that they appear as luxuries.

However, total food expenditure elasticity is well below one (0.641), which is close to that obtained by other researchers like Okunade (0.57), Ostby and Taye (0.609), Jan Vandamooertele (0.634) for urban Kenya and (0.67) for rural Kenya and Humphrey and Howard (0.788) for urban Malawi and (0.706) for rural areas as explained in literature review. The postulated figure for developing countries is 0.6.

Eight out of the sixteen commodities have household size elasticities less than zero, while all the other but, maize grain, were less than one. Only seven of the 16 households size elasticities were not significant at the 5% level. These are, bread, maize flour, packet milk, eggs, rice, fats and clothing.

The Education of the head of the household elasticities were significant at the 5% level in the case of bread, dry beans, packet milk, eggs, fats, english potatoes and clothing

In the case of years of urban residence only elasticities corresponding to eggs and total food were significant at the 5% level. The above results shows that, generally, total expenditure, household size and education are the most important factors in explaining consumer demand patterns in urban Kenya.

However, these general results differ with respect to different commodities. The results also reveal that, a proportionate change in household size will result in a decrease in the proportionate change directed to expenditure on rice, bread, milk, eggs, beef, fares, maize flour and clothing. For majority of the households especially those in the lower and middle income groups most of these commodities may be perceived as luxuries and as household size increased less expenditure is directed to these commodities. A better explanation is perhaps that as household size increases more of the total expenditure is used to purchase the cheaper food commodities like english potatoes, maize grains and dry beans and less on the

commodities with household elasticities less than zero.

The result indicate a substitution away from cheap food commodities to more expensive food commodities as the level of education increase. However, a proportionate change in education result to a decrease in the proportionate change going to total food although this effect is not significant at the 5% level and the estimate is also very low (-0.004). This last result though not significant is difficult to explain. Perhaps it reveal the fact that as the education level of the head of the household increase so does that of other family members especially the children who go away to boarding schools hence reducing expenditure on food generally.

The estimates of education of the head of household and years of urban residence are very small, the highest being 0.107 for education of the head of the household and 0.069 for the years of urban residence, respectively. The low elasticities indicate that education and years of urban residence do not affect the proportion directed to expenditure on the respective commodities greatly. There appear to be correlation in the signs of the estimates of household size and years of urban residence. This can probably be explained by migration since the more one stay in the urban areas the more the probability that migrants from rural areas will join him. Such migrants will mainly be fiends and relatives. It is also evident that the larger the household size the less the expenditure on expensive foodstuffs and the lager the expenditure on cheap foodstuffs particulary expenditure on maize grains.

The coefficient of determination (R^2) ranges from 0.094 in case of maize grains to 0.60 in case of total food. Considering the fact that cross-section data was used this can be considered okey. Moreover, other researchers using cross- section data have found negative

R^2 the explanation of which have not being given[31]. Generally, the range of the values of coefficient of determination obtained in this study is not very much different from that obtained by other researchers. For instance the range of R^2 obtained by Massell and Heyer, was 0.054 in the case of eggs and 0.663 in the case of total food[32]. However, the values are different for different commodities.

The constant terms are all significant at the 5% level and their values are less than one except that of total food as is evident from the negative natural logarithms (see appendix 3).

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[31] Refer to studies by Otundo, rural-urban dualism and the consumption behaviour of Kenya households M.A thesis University of Nairobi 1982 and Jan vandarmoortele, Income distribution and consumption patterns in urban and rural Kenya by social economic groups ILO-Geneva 1982 R.W.P. WEP 2-32/WP38.

[32] Massell and Heyer. Household expenditure in Nairobi, A statistical Analysis of consumer behaviour. Journal of development and cultural change vol 17 page 223 table 5

CHAPTER FIVE.

DEMAND PROJECTIONS TECHNIQUE AND DEMAND PROJECTIONS

The use of expenditure elasticities obtained from urban sector only for national demand projections can give a biased picture about the growth rates in demand especially where the sample size happen to be small. However, in most cases and in absence of rural survey data expenditure elasticities based on one or several urban areas are used. While lack of rural data have restricted this study to the use of only urban expenditure elasticities, we have tried to make use of all the data obtained from the urban sector in order to minimize this problem[33]. The UHBS data can be considered to have covered

population with rural characteristics and consumption behaviour because the 1979 population census indicated that most growth in urban took place in urban centres with population of up to 100,000 most of which are located near rural areas and the interaction with rural people is more frequent than is the case with more urbanised towns.

Expenditure elasticities are used for demand projections which have a wide application in development planning both at the micro and macro levels.

The demand equation used is stated as follows,

$$D = h + bg$$

where, D = the growth rate of demand for a specific commodity

h = growth rate of household numbers, and assuming the size of household

to be constant, can be equated to the population growth rate.

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[33] The urban centres considered were those with population greater than or equal to 2000. According to the Central Bureau of statistics publication on Urban Household Budget Survey 1982/83, 91 urban centres were covered.

      b =   expenditure elasticity of the commodity in question

      g =   rate of growth of private per capita monetary consumption

This is a general demand equation and have been widely used by researchers[34].

To calculate the demand projections, it was necessary to get the growth rate in private per capita consumption. On calculating these growth rates we realised that they were mainly negative prior to 1985. Since there is no a priori method of choosing the period for which the growth rate should be calculated we considered it fit to calculate the average growth rate in private per capita consumption for the period 1985 to 1990. The procedure followed in calculating the average growth rate in private per capita consumption is shown in table 4 below.

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[34] It was for example used by Massell and Heyer and Hunphrey and Horward in their studies. (refer to foot notes 30 and 32)

TABLE 4 GROWTH RATE IN PER CAPITA CONSUMPTION

YEAR	POPULATION MILLIONS	PRIVATE CONSUMPTION CONSTANT 1982 PRICES K£ MILLIONS	PRIVATE PER CAPITA CONSUMPTION CONSTANT 1982 PRICES KSHS MILLIONS	GROWTH RATE IN PRIVATE PER CAPITA CONSUMPTION CONSTANT 1982 PRICES KSHS MILLIONS
1985	20.33	2171.7	2136.449	14.3
1986	21.16	2584.7	2443.006	0.2
1987	22.94	2806.9	2447.167	3.8
1988	23.88	3033.5	2540.620	1.7
1989	24.80	3203.4	2583.387	7.8
1990	24.9	3467.3	2784.980	

The average value (5.56) was obtained by getting the average of the figures in the last column of table 4 above.

Source: 1.   Government of Kenya, Ministry of Planning and National development, Long Range Division, Historical Economic Data for Kenya Technical paper 91-12 table 5.

2.   Government of Kenya, Economic Survey 1991

Table 5 below shows the procedure used in calculating the growth rate in demand for the various commodities indicated. The last column of table 5 shows the rate of growth in demand. The range of the growth rates is 7.5 for total food and 23.4 for clothing. These values are very high which can be attributed to the high population growth rate in Kenya, the high expenditure elasticities which as argued earlier might be reflecting the nature of the data and also the high growth rate in per capita private consumption as a result of the choice of the period where positive figures were considered.

The choice of the period for which the per capita growth rate in private consumption is very important since different growth patterns will lead to different results. Although there is no standard method of choice of such a period, it is intuitively reasonable to consider the period not far off from when the demand projections are being made. The high values of the growth rates however, indicate that even if adjustments are done to cater for overestimation if any, the values will still be considerably high. As shown in a latter section these values are not very much different from those obtained by other authors where comparison is possible. Apart from beef, all the items under the category of luxury goods have very high demand growth rates. A tentative comparison of some of the growth rates in demand with rates of growth in out-put reveals that unless drastic changes are made the country will continuously be a net importer of most of the commodities [35]. A better comparison is perhaps that which shows the implication of expenditure elasticities through demand projections of imports of several consumer products. This is brought out clearly in the next section.

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[35] Consult table 6 where the growth rates in production of several products are shown.

TABLE 5 DEMAND PROJECTIONS FOR SEVERAL COMMODITIES

COMMODITY	POPULATION GROWTH RATE[*]	EXPENDITURE ELASTICITY	GROWTH RATE IN PER CAPITA PRIVATE CONSUMPTION CONSTANT 1982 PRICES KSHS M FOR THE PERIOD 1985-1990	GROWTH RATE IN DEMAND
SUGAR	3.9	1.202	5.56	10.6
RICE	3.9	0.923	5.56	9.0
WHEAT FLOUR	3.9	2.361	5.56	17.0
BREAD	3.9	0.995	5.56	9.4
PACKET MILK	3.9	0.929	5.56	9.0

	3.9	2.240	5.56	16.4
CHARCOAL				
EGGS	3.9	2.002	5.56	15.0
FATS (KIMBO & COWBOY)	3.9	1.265	5.56	10.9
BEEF	3.9	1.018	5.56	9.6
DRY BEANS	3.9	1.455	5.56	12.0
MAIZE GRAINS	3.9	0.739	5.56	8.0
MAIZE FLOUR	3.9	0.972	5.56	9.3
FARES	3.9	2.619	5.56	18.5
ENGLISH POTATOES	3.9	2.011	5.56	15.1
TOTAL FOOD	3.9	0.641	5.56	7.5
Clothing	3.9	0.351	5.56	23.4

Source: The expenditure elasticity figures were obtained from the regression results shown in table 3.

The growth rate in per capita private consumption figure was calculated from data in table 4.

* Average population growth rate figure was obtained for the period 1980-1990 from the World Bank Atlas 1991 the value was 0.1 point higher than that estimated by the Central Bureau of Statistics (3.8%) and 0.2 point lower than that projected for the period 1984-2000.

TABLE 6 OUTPUT PROJECTIONS THOUSANDS TONNES

COMMODITY	1987 ACTUAL	1988 PROJECTED	1993 TARGETED	RATE OF GROWTH %
MAIZE	2583	2540	3090	1.04
WHEAT	2507	231	255	1.02
SORGHUM AND MILLET	176	181	210	1.03
RICE	26	28	41	1.08
BEANS	294	309	394	1.05
POTATOES	782	821	1048	1.05
SUGAR	413	426	525	1.05
BEEF	171	172	181	1.01
MILK	1503	1534	1693	1.02
TEA	156	160	204	1.05

		Table 6	continued	
COFFEE	105	123	150	1.04
SISAL	43	44	51	1.03
PYRETHRUM	6.4	6.7	7.8	1.03
COTTON	42	45	67	1.08
TOBACCO	6	6	8	1.04
HORTICULTURE	40	44	70	1.10

SOURCE: Government of Kenya. Kenya Development plan 1989-93 page 107 table 6.1.

CHAPTER SIX.

IMPLICATION ON IMPORTS OF CONSUMER COMMODITIES

In this section we calculate the growth rates of imports of consumer products of the major commodities from the implied growth rates of demand and production under several assumptions about the consumption pattern and production. Specifically the following linear relationship is used to estimate the growth rates of imports.

$$Dm = Dc - Gp$$

where,

Dm = growth in demand for imports of the commodity in question

Dc = growth in demand for the commodity in question.

Gp = growth in production of the commodity in question.

This section shows the growth rate of imports of a few consumer products. It is assumed that, the expenditure elasticities estimated will prevail in the future. Since the functional form used give expenditure elasticities that reflect long-run consumption patterns[36], the assumption is not a restrictive one although in the short run it may not hold. The other assumption is that, production patterns will follow the one perceived during the period 1986-89. This period was chosen for several reasons. One reason is that this period comprise that period during which structural adjustment programmes were implemented and as such the growth rate is expected to be different from the previous periods. Secondly in 1986 Kenya produced the first document concerning long-term development goals. This document, Sessional paper number one of 1986 on Economic Management for Renewed growth,

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[36] Hu, T. W. Econometrics. An introductory analysis
University Park Press Baltmore. London. Tokyo 1973
page 97.

expressed the country's long term development goal, strategies and policies. It is assumed

here that the growth rates since 1986 should reflect the long-term development goals set in

the Sessional paper[37]. This period was also considered in calculating the per capita growth

rate in private consumption and hence for consistency it was preferred to any other.

Data availability problems have greatly hindered the comparison between growth rates of

demand and production growth rates. For that reason we have used the average annual growth

rate in value of gross marketed production and even in this case with several generalisations.

Data was only available for the commodities and period shown in table 7. The last but one

column of the table show the implied growth rates in demand for some food products for

which data was available. The results show that, eggs have the highest growth in demand

for imports followed by rice, wheat, sugar and finally maize. The production growth rate

figure for eggs include paultry which might have contributed to the results obtained since the

demand growth rate does not include paultry.

Care need be taken in interpreting the growth rates for erroneous conclusions can be

made. For instance, the negative growth rate in demand for imports of milk indicate that,

although imports will be necessary the demand for them will be decreasing which is an

indication that, the domestic rate of production is increasing at a higher rate than domestic

rate of demand. One might be tempted to argue that, the negative growth rate reveal that

Kenya is a net exporter which is not the case. This is clearly shown in table 8 where it is

shown that although the production of milk will have increased from 169,300 tonnes in 1993

according to the projections, the demand of 25,000,000 will not be met and imports will be

necessary.

It is a general observation that, the commodities usually in short supply have higher import growth rates. the implication is that unless production of such commodities is step-up the country will continuously rely on imports and the need to import will be increasing with time. Moreover, more and more foreign exchange will have to be devoted to importation of such commodities. This will reduce continuously the foreign exchange allocated to importation of capital goods and the growth rate of the economy and the level of development will be slowed down.

TABLE 7 THE IMPLICATION ON IMPORTS OF CONSUMER PRODUCTS

COMMODITY	AVERAGE ANNUAL GROWTH IN VALUE OF GROSS MARKETED CROP PRODUCTION AT CONSTANT 1982 PRICES K£M 1986-1990 (GP)	GROWTH RATE IN DEMAND (DEMAND PROJECTIONS) (DC)	IMPLIED GROWTH RATE IN DEMAND FOR IMPORTS DM = DC-GP
WHEAT	9.075	17	7.925
MAIZE	4.1	8.7	4.6
RICE	-3.0	9	12
SUGAR	5.85	10.6	5.25
TEA	5.375	-	-
COFFEE	4.95	-	-
EGGS	1.7	15	13.3
MILK	40.15	9	-31.15
OTHER CEREALS	.00	-	-

SOURCE: Republic of Kenya, Historical data for Kenya 1972-90 technical paper 91-12
Long range planning division. Ministry of Planning and National Development
Government printer Nairobi December 1991.
Also data obtained from calculations by the author see text.

TABLE 8   BASIC FOOD PROJECTION DEMAND/PRODUCTION/PROJECTIONS

('000 TONNES)

commodity	per capita consump- tion (kgs/per s/yer)	1988 demand	1988 producti-on	1993 demand	1993 producti-on
MAIZE	100	2250	2540	2670	3090
WHEAT	19.4	440	231	535	255
SORGHUM AND MILLET	7.7	175	181	213	210
RICE	3	69	28	84	41
BEANS	13.2	300	309	366	394
POTATOES	33.5	760	821	925	1048
SUGAR	17.6	399	126	523	525
BEEF	8.1	183	172	223	181
MILK	91.0	2060	1534	2500	1693

SOURCE: Government of Kenya. Kenya Development plan 1989-1993 page 110 table 6.2.

CHAPTER SEVEN.

COMPARISON WITH OTHER STUDIES WITH SPECIAL REFERENCE TO EAST AFRICA.

The comparison of results between any one researcher and other researchers' work has become almost a tradition. However, more often than not such a comparison is usually done without any qualification and in the final analysis tend to be useless. As has been already explained in the methodology, the choice of a certain functional form together with the data used and its organisation procedure do highly influence the results obtained. The implication is that, unless the same functional form is used in all the studies to be compared, and the data used is similar and organised in the same way, then such a comparison is questionable.

Moreover, the sample range and the population covered is usually very different and in most cases comparison cannot be made. For instance, comparison of results obtained from a study executed in the urban area of a certain country and covering only the high income or middle income group, with another study carried out in the rural area of another country is of no value, at least, if the income brackets in the two countries are similar. However, tentative comparisons can be made especially where there is a theoretical backing. For example, theoretically the Engels law is assumed to hold. That is, expenditure elasticities for food commodities are expected to be less than one. So comparison of different studies can reveal how well such a law is satiated for various commodities and different communities. Due to the reasons given above comparison will be made for only those studies that have used the double log function. Moreover different commodity groupings have been used in different researches as a result the commodities considered in the current study will be used as the base for the list of comparison.

Table 9 shows the various elasticities for studies that have utilised the double log function in East Africa. The various results reveal that, a direct comparison of commodities is hindered by commodity classification that have been used by the different authors. However, Some general observations can be made from the table.

It is clear that very few studies have considered individual commodities in their estimation of the various elasticities. This has mainly been attributed to data problems. Most of the studies estimate expenditure and household size elasticities and as explained else-where in the text, the argument is that previous studies have found other explanatory variables

insignificant. The expenditure elasticity obtained in our study lies between those obtained by Massell and Heyer in Nairobi Kenya and those obtained by Humphrey and Howard in urban and rural Malawi. ''Transport'' emerged as a luxury in all the studies compared both for the urban and rural households. However, the value of the estimates are considerably high in the case of this study as compared to the other studies. The proportion of expenditure on transport is found to decrease with proportionate household size increase. In other words there is a negative correlation between percentage change in household size and percentage change in expenditure on transport.

A rather surprising but general results evident in all studies compared is the fact that, a percentage change in household size will result to a decrease in the percentage change on expenditure of maize flour. The probable explanation is that maize flour although a necessity and major food stuff is more expensive in east Africa and hence as the household size increase less of it is bought and more other foodstuffs are purchased like maize gains. This is evident from the results shown in table 9 since a proportionate increase in household size will increase the expenditure on maize grains more than the proportionate increase in household size.

However, a percentage increase in years of education will lead to percentage decrease in expenditure on maize grains. The expenditure elasticities for beef are similar in Kenya for both urban and rural areas as our study and that executed by Massell and Heyer reveal. The pattern perceived in case of fats and oils is not very much different from that perceived in case of beef.

Considering the estimates of expenditure elasticities obtained in our study and those obtained by Humphrey and Howard, eggs can safely be classified under the category of luxuries for urban households in both Kenya and Malawi. Sugar fall under the luxury category in urban Kenya as the results of our study indicate and in rural Uganda as expenditure elasticities obtained by Howe reveal. Milk and milk products fall under the category of luxuries in both urban Malawi
and Dar-Es-Salaam Tanzania. The expenditure elasticities for milk obtained in our study are also very high.

Generally the results obtained in our study appear to agree with those found by other authors. Thus we can hereby conclude that the functional form chosen fit the data well. However in conclusion we may note that, a lot of diversity exist between different

commodities which could be due to methodology used, data difference, difference in consumer patterns as a result of varying political situations, environmental conditions, cultural and religious differences etc.

7.1   A COMPARISON OF DEMAND PROJECTIONS

Only a few studies have attempted to make demand projections. In all the studies reviewed broad commodity classifications have been used which make comparison of the results of our study with those of other studies difficult However, we are going to make a tentative comparison. Such a comparison is shown in table 10. In case of Humphreys results case I indicate the situation where both urban and rural expenditure elasticities are used. Case II show the results where only urban expenditure elasticities are used, while case III shows the result where the effect of difference in population growth rate is ignored.

The results reveal that no general pattern emerge from comparison of the results. however, with respect to the results obtained in this study and that obtained by Massell and Heyer it appear that the highest value was obtained in the case of clothing while the lowest value was associated with maize grains in both studies. The values of total food reveal that the results of this study lie between those obtained by Massell and Heyer and those obtained by Humphrey and Howard. The high values obtained by Humphrey and Howard, could be an indication of the biases in the other studies estimates due to use of data that does not consider all the sectors of the countries concerned while the lower values in the case of Massell study could be an indication of the lower growth rate in population prevailing in Kenya in early 1960s when the study was conducted as well as the nature of the data used.

CHAPTER EIGHT

CONCLUSIONS AND POLICY IMPLICATIONS

One of the major findings of this study is that although the results of broad categories can be consistent with theoretical expectations the, individual commodities results can usually be very different from the general results. This is evident from the expenditure elasticities of the individual food commodities and that of total food. The result indicate that while the expenditure elasticities for total food is less than one (0.641) as would be expected theoretically, the expenditure elasticity of individual food commodities are greater than this value and for several foodstuffs greater than one. (see table 3). So although the Engels law is satiated for food in general it does not hold true for several food products namely, sugar, wheat flour, eggs, "fats" beef, dry beans and english potatoes in this study. This reveals the need to execute a desegregated commodity by commodity analysis instead of broad category classification analysis. This was one of the major objectives of this study.

One of the criticisms of the studies reviewed as explained in the overview literature, is that, other authors who have conducted such a study have used very broad category classifications. This study has shown clearly how such a classification can give erroneous conclusions and as such have overcome that weakness. This also call for the need to follow a desegregated analysis in demand estimations.

We are bound to conclude here that, while broad category classifications result may comply with theoretical expectations, the case may be different when individual commodities are taken into account.

Like other budget studies this study have found out that total expenditure and thus income as well as household size are the major determinants of consumer demand pattern. However, other factors like education are also important. It is also evident that different factors affect consumption of various commodities differently such that while one factor may be significant in determining the consumption or demand of a certain commodity it may not be significant in determining the demand for other commodities. This reflect the need to include as many factors as possible in estimating demand equations.

The findings of this study reveal that commodities that are usually in short supply and hence necessitate imports are among the commodities with highest demand growth rates and also under the category of luxury goods. It is also evident that as household size increase

there is a shift away from more expensive foodstuffs to cheaper ones. The implication is that as population increase demand for cheaper foodstuffs may increase at the expense of expensive foodstuffs. This call for increased production in such cheap food crops since Kenya's population is the highest in the world. Otherwise as demand for such cheap food crops increase the price may go up as is expected and the common man be unable to meet them hence being reduced to destitute cases. Poverty is also likely to increase. Moreover, such measures as Government rationing will only involve more wastage of necessary resources for development.

The expenditure on expensive protein yielding commodities decrease proportionately as household size increase. We may also conclude that a proportionate change in population growth rate and thus household size will call for a more than proportionate change in expenditure on the main foodstuffs
(e.g maize) in Kenya which imply that, If demand will have to be met production of maize will have to increase more than the proportionate growth in population. The growth rate in demand for maize in the sessional paper number one of 1986 is only 0.7 point less the findings of this paper. A comparison of the calculated average annual growth in value of gross marketed crop production at constant 1982 prices, with the projected crop production growth rates show that, this study has overestimated the growth rates save for maize and paultry where this study results are 0.6 points less for maize and 4.3 points less for paultry. However, the latter category include only eggs in case of this study which might contribute to the high variation. The implication of this is that, the estimated growth rate of import figures are underestimated for most of the products.
This is even more pronounced when one consider the projected growth rates in out put shown in table 6.

It is also evident from table 7 that the growth rate in rice production has been declining (-3%). This implies that out put has been decreasing. This seems to be in line with the findings obtained by the National Audit office report that, the Bura irrigation scheme is not worth it. The project which is the main source of Kenya's rice, was started by the Kenyan Government and British Government Overseas Development Administration in 1978. The World Bank has also pumped some finance to the project. It has been reported that, the project cost three times the initial budgeted cost and generated only 40% of the expected employment. However, it is surprising that, crop yield has been declining which has been

attributed to unreliable water supplies.

The growth in demand for all products save for milk are greater than the production growth rates where such a comparison is possible. This shows that, the implied growth rate in demand for imports are positive. Consequently, Kenya will continuously rely on imports of such products unless measures are taken immediately. Moreover, it is obvious that a lot of foreign exchange will have to be spent on the importation of several food commodities if local demand has to be met, otherwise starvation may even result. The question which only time can give an answer is for how long Kenya will manage to continuously import such products. Given that foreign exchange constraint is a real fact in Kenya and that population growth rate is the highest in the world, it implies that quick action need to be taken to avoid the situation getting out of control.

The need for a policy to achieve self-sufficiency in food supply and food security was realised back in 1980. The policy was restated in 1986 in the sessional paper number one of 1986 on Economic Management for Renewed growth where it was pointed out that, foreign exchange going to food imports should be reduced to zero and the country be self-sufficient in production of foodstuffs as well as be able to meet temporary shortages in production. Surprisingly, little seem to have been achieved a decade after the policy was put down.

It is thus evident that, all is not well and something need to be done to reverse the high growth rate in demand for imports of foodstuffs among other products. It is necessary that the policies formulated and strategies lied down take into account the demand patterns of the consumers.

Perhaps the reason why the targets set in 1980 and 1986 have not been achieved is because the projection and policies put forward in the process of planning, ignored the consumers demand pattern which is sometimes hard to change.

The Government should make sure that policies and strategies formulated do not only exist on paper but are implemented immediately and monitoring of the performance executed regularly. It is not surprising to note that, well formulated and sound policies are set but are never put into practice or the application of such policies are hindered by other set up policies in different Government organisations and parastatals. For example, it was recommended in the sessional paper of 1986 no 1 that, competitive in marketing of milk would be enhanced to increase efficiency and production of milk and dairy products. However, it is illegal to sell milk to any other body but Kenya Creameries Co-operation (KCC). So there is a

contradiction between what is put down in writing and what actually take place in some cases.

It is obvious that, the Government should put a lot of effort in increasing the growth rate in production of food products if imports will have to be reduced and finally eliminated. The results of this paper imply that the already set targets in growth rate of production should be revised with an upward bias in all cases. Production can be greatly increased by using incentives like changing the, pricing policies, marketing policies extending credit to farmers, intensification of extension services and supply of better seed and farm inputs as wells as informing farmers on research findings. Restrictive policies especially those concerning distribution of food should be adjusted in favour of more liberal distribution.

It is also evident from several researchers that, the reliance on foreign aid usually hinder domestic production of several products[38]. For instance, sugar which is one of the commodities mostly in short supply can be produced in large quantities than has been the case. But tied AID have affected the production of sugar in some of the factories (e.g Nzoia sugar factory). Some times the Government rely on AId for payment to farmers[39]. Such reliance on donors when it fail to materialise discourage farmers and affect production. Thus the Government should move away from reliance on such a measure. Moreover, when AID is being negotiated for the people involved should be well informed and must try as much as possible to avoid tied AID. AID in whatever form it is obtained place a lot of burden on future generations since it has to be repaid with interest and hence the more reason it should be avoided whenever possible.

The monopolies that exist in marketing of farm products should be broken to increase competition and efficiency and thus encourage farmers to increase production. The management of such institutions should be streamlined to avoid mismanagement, that is prevalent in most government organisations and parastatals. Regular auditing by external auditors should be executed and any irregularities reported and corrected immediately.

We should also recommend here that research be deployed to rural areas or rather in the

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[38] See Ikiara G. K. and Coughlin P. industrialisation in Kenya in search of a strategy. Heinemann Kenya limited Nairobi Kijabe street 1988.

[39] See Sessional Paper number one of 1986 on Economic Management for renewed growth pages 68 and 70

farms where the particular crop is being grown. The extension officers should be well informed about the people's attitudes within the location he is assigned. Such officers should be able to communicate with the local people and frequent transfers should be avoided. The Government should take measures to avoid under-employment. It have already been established that, some Government ministries use more than 60% of recurrent expenditure to pay for salaries while some department use more than 90% of their allocated funds for salaries. Agriculture and life stork ministry is the often quoted with respect to underemployment and excessive spending on salaries, in particular, the extension service department expenditure on salaries is greater than 90% of the allocated funds[40]

The existing land tenure policies should be changed to enable the utilisation of any idle land especially in the high and medium potential areas. Credit should be made available to all farmers to enable them to purchase the necessary farm inputs and thus promote production. Also drought resistance crops should be introduced in semi arid areas where they do not exist. The authorities concerned should also try very much to control the population growth rate .

LIMITATIONS OF THE STUDY

Generally, every study has its own limitations. Unfortunately more often than not, authors are not sincere to give the weakness of their studies or rather to criticise their work. This task is usually left to the third party. In this study, all the perceived limitations are highlighted in order to assist potential researchers in this field. We would consider it un professional and academically unethical to conceal limitations or weaknesses of ones study when one has the knowledge.

Most studies are usually faced with data problems, and in particular data availability. This study is not an exception in this respect. The lack of rural survey data restricted us to the use of expenditure elasticities based on urban areas to make nation-wide demand projections and although majority of the studies have followed a similar procedure, it has been pointed out by Humphrey and Howard that, such a method may not give the actual picture because consumer demand patterns vary between different localities. However, in absence of data one

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40   Government of Kenya, Sessional paper No. 1. of 1986
      on Economic Development for Renewed Growth.
      Government printer Nairobi.

is left with no option but to use urban expenditure elasticities in making such demand projections. As explained earlier data from about 91 urban centres was utilised in an attempt to minimize the effects of this weakness. Since the data covered about 86% of the urban areas and most of the urban areas especially those that have registered the highest growth were close to the rural sectors one can although tentatively argue that some kind of rural consumption behaviour was captured by the data. Moreover the difference in results when one assume the same expenditure elasticities for both urban and rural is little[41]. The tendency has been to under estimate the growth in demand when expenditure elasticities derived from urban areas are used to make nation-wide demand projections. As mentioned earlier, data problems limited the number of commodities included. However we utilised all the information available to the maximum in order to minimize this problem. The list of the commodities included in calculating the growth rate in demand for imports was also highly restricted by both data availability and also the commodity classifications used in the various government publications. This does not mean the study is weaker in any respect because the commodities covered are the ones mainly in short supply majority of which are food stuffs. Data problems also restricted the number of explanatory variables to the one shown as well as the method of estimation as explained earlier. So the use of OLS might have resulted to simultaneous equation bias but due to non availability of income data which could have been used as an instrumental variable, little could be done about this problem. Moreover, the similarity of the results with those of other studies show the bias is probably small if it is present.

SCOPE FOR FURTHER RESEARCH

This study has analyzed consumer behaviour for several commodity products in Kenya. However, the number of commodities was limited by non-availability of data among other factors. Further research can be extended in this field particularly in the area of manufactured goods which were not generally covered in this study.

The study did not incorporate rural data because it was not available. Future studies should make an attempt to include data from rural areas in order to capture the Urban-Rural differences. It has been shown that locality does influence the consumption pattern of

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[41] Refer to footnote number 30 page 264.

individuals. This call for further research in different sections of the country.

further research need be extended to the areas of the theoretical properties of demand functions. For instance, if a certain community is found to suffer from money illusion this can have very important policy implications especially with respect to changes in income and prices.

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APPENDIX 1

FIGURE 1

A Multi-domentional schematic framework for development
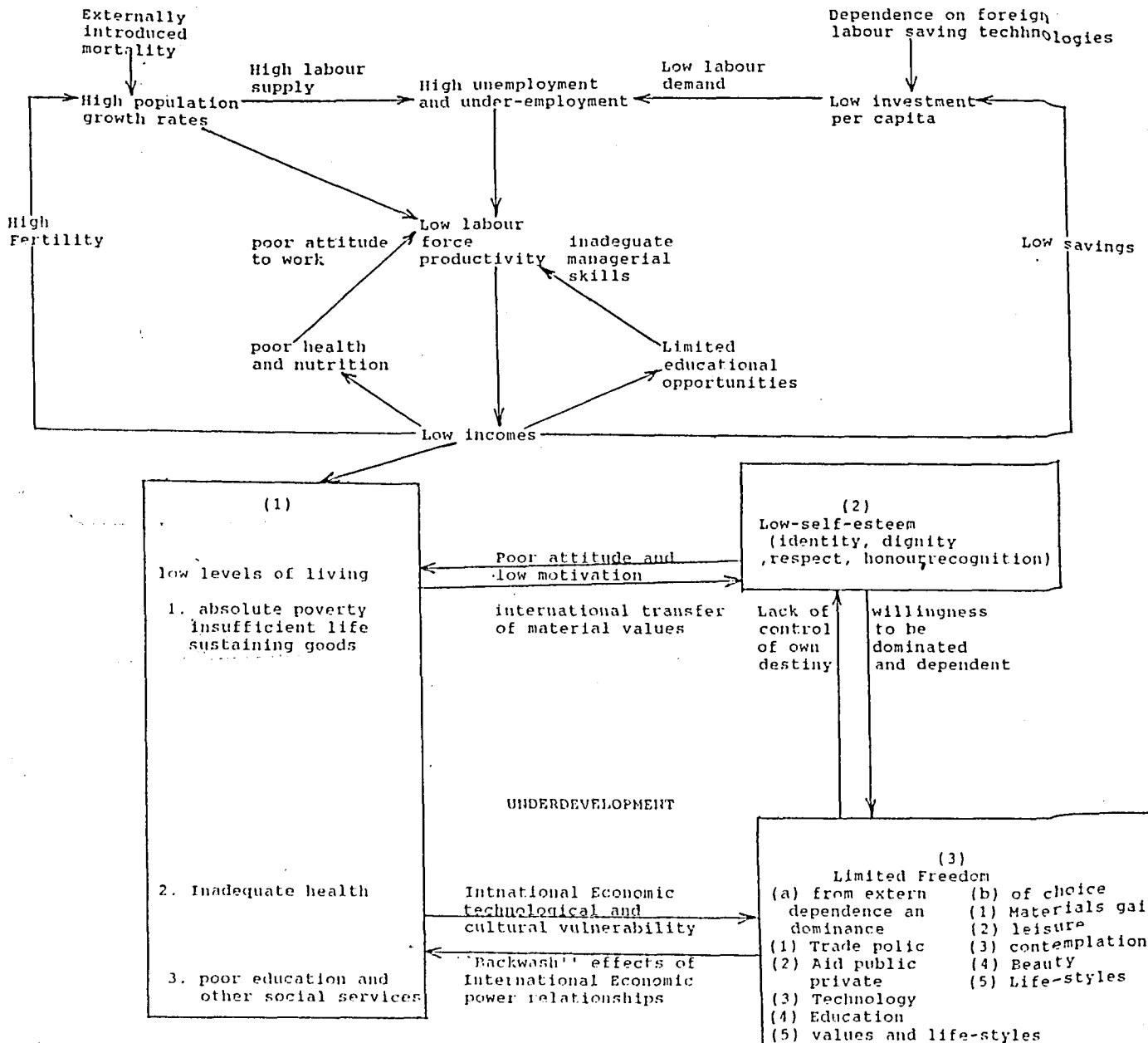
Source: Todaro M. P. Economics for a developing world. Longman Group Limited 1982
          page 100 figure 6.1

APPENDIX 2

TABLE 1   NET IMPORTS OF SEVERAL CONSUMER PRODUCTS IN KENYA

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
MAIZE	893	10	-5579	-3363	-5042	-5635	-650	-695	-5317	25076	5752	11365	-12158	48124	12304	-14475	-1949
WHEAT	-133	1424	3401	890	4207	-23	1939	5873	2432	4992	4464	13905	9279	20796	19057	12054	17499
RICE	713	36		331	17	1204		2	46	235	1240	2726	10037	52	99	11310	5333
SUGAR	4003	7130	6761	8978	2606	7486	3998	4574	1410	453	554	499	569	395	5727	25618	10024
MILK DRY	395	-126	-273	-3395	-2376	-835	-296	-1081	-1204	5110	5811	1934	2601	5939	2432	566	-705
BEVER.	1426	1012	1464	3512	3210	5391	3180	6887	6583	1503	1248	1197	-877	-504	-3522	-7041	-2373
CLOTHING	3423	2736	3152	5952	4957	6401	7988	4429	2392	3447	3860	724	939	1589	833	1388	1750
ANIMAL VEGET OILS AND FATS	3502	3160	4254	7776	7071	10124	13516	15862	15294	22021	23607	25910	45071	33099	46474	45873	40823
FOOTWEAR	159	15	188	287	571	537	1165	2030	1538	2929	1511	-94	24	1097	-69	120	238
FURNIT AND FIXTURES	666	257	196	332	171	304	250	361	625	1092	670	726	340	1076	683	584	1077
PAPER AND PAPER PRODUCTS	6071	5997	7925	14102	5316	1689	3669	5353	5625	4769	9331	5418	5549	4951	10514	14491	15848
UNIVER PLATES AND SHEETS	8258	8878	13098	25426	13856	25893	29182	38249	34067	44614	32593	35004	46962	54654	56707	56836	73312

Source: Government of Kenya. Economic Surveys and Statistical Abstracts various issues

TABLE 2 CLASSIFICATION OF HOUSEHOLDS INTO   INCOME GROUPS

STRATA.	UNDER HOUSEHOLD %	KSHS2000 AVERAGE INCOME	KSHS 2000 H/HOLDS %	-7999 AVERAGE INCOME	KSH8000 + H/HOLDS %	AVERAGE INCOME	TOTAL NO. OF H/HOLDS	AVERAGE INCOME
NAIROBI	74.79	908	22.74	3503	2.47	14020	12676	1822
MOMBASA	62.95	928	35.66	3982	1.39	16395	7555	2232
THIKA	87.76	838	10.20	3920	2.04	9067	931	1320
NAKURU	77.39	836	19.51	3627	3.10	12965	1902	1757
ELDORET	85.19	845	12.96	3296	1.85	12625	1188	1381
KISUMU	76.34	915	17.46	3500	6.20	14078	1775	2182
OTHER TOWNS	73.37	941	22.78	3297	3.84	13311	9832	1953
TOTAL	72.80	912	24.78	3604	2.31	13822	35859	1931

ALL AVERAGE INCOMES ARE AVERAGE MONTHLY INCOMES
SOURCE: Urban household budget survey, 1982/83 Central Bureau of
        statistics Ministry of planning and national development
        Government printer Nairobi 1990 page 21 table 3.6

A COMPARISON OF SEVERAL STUDIES DONE IN EAST AFRICA

TABLE 9

	OUR STUDY KENYA URBAN			MASSELL AND HEYER KENYA NAIROBI			KENYA RURAL		HUMPHREY AND HOWARD MALAWI URBAN		MALAWI RURAL		OSTBY IVAR TANZINIA URBAN		KENYA	HOWE UGANDA
	EXP	HHS	EDUCA	EXP	HHS	EDUCA	EXP	HHS	EXP	HHS	EXP	RURAL	EXP	RURAL		
SUGAR	1.202	0.505	-0.006	0.234	0.579	0.022			0.476	0.964			0.58	0.48		1.06
RICE	0.923	-0.142	-0.006	0.254	0.485	0.233										
WHEAT	2.361	0.871	0.107	0.448	0.371	0.035										
BREAD	0.995	0.138	0.028						0.624	1.381						
MILK	0.929	-0.192	0.058	0.483	0.523	0.004	2.34		1.009	1.061			1.15	-0.15		
FUEL	2.24	0.743	0.023	0.161	0.501	0.033	0.69		0.886				1.22	-0.22	1.56	
EGGS	2.002	-0.273	0.104	0.417	0.081	0.067			1.674	0.341						
FAT	1.265	0.193	0.037	0.591	0.358	0.004	1.22		0.903	1.24						
BEEF	1.018	0.233	0.022				1.2		0.895				0.61	0.28		
BEANS	1.455	0.722	-0.094													
MAIZEGR	0.739	1.004	-0.051	-0.011	0.793	-0.044			0.283	1.814						
MAIZEFL	0.972	-0.217	0.007						0.534	-0.917						
TRANSPORT	2.619	-0.766	0.027	1.086	-0.02	0.034			1.477	-1.33	1.161	-0.692				6.119
POTATOES	2.011	0.576	0.059													
TOTALFOOD	0.641	0.156	-0.004	0.441	0.39	0.018			0.766	0.367	0.706	2.444				

Source: The results obtained by the author of this study and those obtained by the other authors,
Refer to Massell and Heyer, Household expenditure in Nairobi: Astatistical analysis of consumer behaviour
Journal of Development and cultural change vol 17 1969 page 223 table 5, Humphrey and Howard, Expenditure
and household-size elasticities in Malawi Urban-Rural comparison, Demand projections and a summary of east
African findings. Journal of Development Sudies vol 12 no. 2 1976 pege 256 table 1 and page 267 table 4
The results for the sudies done by the other authors can be obtained from Humphrey and Howard study mentioned
above peges 266/7 table 4.

TABLE 10

COMPARISON OF DEMAND PROJECTIONS

COMMODITY	OUR STUDY	MASSELL AND HEYER	HUMPHREY AND HOWARD		
			CASE I	CASE II	CASE IA
SUGAR	10.6	4.1			
RICE	9.0	6.2			
WHEAT FLOUR	17.0	5.2			
BREAD	9.4				
PACKET MILK	9.0	5.0			
CHARCOAL	16.4	4.0			
EGGS	15.0	5.3			
FAT	10.9	5.4			
BEEF	9.6	4.9			
DRYBEANS	12.0				
MAIZE GRAINS	8.0	2.5			
MAIZE FLOUR	9.3				
TRANSPORT	18.5	7.7			
ENGLISH POTATOES	15.1				
TOTAL FOOD	7.5	4.9	9.9	6.3	6.2

It is evident from the above table that comparison was greatly hindered
by very broad category classification of the other studies

Source: Results Obtained from the regressions of this study and those obtained by Massell
and Heyer, Household expenditure in Nairobi: A statistical analysis of consumer behaviour
Journal of Development and cultural change vol 17 1969 page 227 table 7
and Humphrey and Howard, Expenditure and household-size elasticities in Malawi Urban-Rural
comparisons, Demand projections and a summary of East African findings. Journal of development
studies vol 12 no. 2 1976. page 264 table 3

APPENDIX 3

REGRESSIONS RESULTS

$logSugar^{42}$ = -6.841 + 1.202$logX_j$ + 0.505$logH_j$ - 0.006logEd
        (0.504)   (0.076)   (0.113)   (0.014)
                  - 0.007logRE
                  (0.021)
                  D.W = 2.031 R^2 = 0.174 F-Statistic = 79.110

$logRice$ = -5.434 + 0.923$logX_j$ - 0.142$logH_j$ - 0.006logEd
        (0.406)   (0.061)   (0.090)   (0.011)
                - 0.015logRE
                (0.017)
                D.W. = 2.105 R^2 = 0.197 F-Statistic = 91.362

logWheat
   Flour = -20.397 + 2.361$logX_j$ + 0.871$logH_j$ + 0.107logEd
          (0.860)   (0.131)   (0.197)   (0.024)
                + 0.048logRE
                (0.037)
                D.W. = 2.043 R^2 = 0.229 F-Statistic = 111.863

$logBread$ = -5.160 + 0.995$logX_j$ - 0.138$logH_j$ + 0.028logEd
          (0.393)   (0.06)   (0.088)   (0.011)
                + 0.007logRE
                (0.017)
                D.W. = 2.003 R^2 = 0.151 F-Statistic = 66.863

logpacket
    milk = -5.475 + 0.929$logX_j$ - 0.192$logH_j$ + 0.058logEd
          (0.552)   (0.082)   (0.121)   (0.015)
                + 0.012logRE
                (0.023)
                D.W. = 2.252 R_2 = 0.261 F-Statistic = 132.430

$logCharcoal$ = -18.718 + 2.24$logX_j$ + 0.743$logH_j$ + 0.023logEd
             (0.980)   (0.148)   (0.219)   (0.027)
                - 0.011logRE
                (0.041)
                D.W. = 2.138 R^2 = 0.209 F-Statistic = 99.444

$logEggs$ = -15.058 + 2.002$logX_j$ - 0.273$logH_j$ + 0.104logEd
          (0.786)   (0.120)   (0.176)   (0.022)
                - 0.077logRE
                (0.034)
                D.W. = 2.036 R^2 = 0.203 F-Statistic = 95.600

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[42] Refined sugar.

$$logFats^{43} = -7.417 + 1.265logX_j + 0.193logH_j - 0.037logEd$$
$$ (0.620) \quad (0.094) \qquad (0.139) \qquad (0.017)$$
$$- 0.033logRE$$
$$(0.026)$$
$$D.W. = 2.035 \quad R_2 = 0.119 \quad F\text{-Statistic} = 50.855$$

$$logBeef = -5.512 + 1.018logX_j - 0.233logH_j + 0.022logEd$$
$$ (0.478) \quad (0.073) \qquad (0.107) \qquad (0.013)$$
$$- 0.031logRE$$
$$(0.020)$$
$$D.W. = 2.045 \quad R^2 = 0.123 \quad F\text{-Statistic} = 52.585$$

$$logDrybeans = -13.013 + 1.455logX_j + 0.722logH_j - 0.094logEd$$
$$ (0.839) \quad (0.127) \qquad (0.188) \qquad (0.023)$$
$$+ 0.058logRE$$
$$(0.036)$$
$$D.W. = 2.064 \quad R^2 = 0.123 \quad F\text{-Statistic} = 52.592$$

logMaize
$$Grain = -12.078 + 0.739logX_j + 1.004logH_j - 0.051logEd$$
$$ (0.981) \quad (0.148) \qquad (0.213) \qquad (0.027)$$
$$+ 0.069logRE$$
$$(0.041)$$
$$D.W. = 2.076 \quad R^2 = 0.094 \quad F\text{-Statistic} = 39.640$$

logMaize
$$Flour = -5.697 + 0.972logX_j - 0.217logH_j + 0.007logEd$$
$$ (0.528) \quad (0.078) \qquad (0.115) \qquad (0.014)$$
$$- 0.004logRE$$
$$(0.022)$$
$$D.W. = 2.232 \quad R^2 = 0.257 \quad F\text{-Statistic} = 129.895$$

$$logFare = -18.703 + 2.619logX_j - 0.766logH_j + 0.027logEd$$
$$ (0.998) \quad (0.151) \qquad (0.224) \qquad (0.028)$$
$$- 0.001logRE$$
$$(0.042)$$
$$D.W. = 2.032 \quad R_2 = 0.186 \quad F\text{-Statistic} = 85.624$$

logEnglish
$$potatoes = -16.224 + 2.011logX_j + 0.576logH_j + 0.059logEd$$
$$ (0.850) \quad (0.128) \qquad (0.190) \qquad (0.023)$$
$$+ 0.030logRE$$
$$(0.036)$$
$$D.W. = 2.107 \quad R^2 = 0.229 \quad F\text{-Statistic} = 111.427$$

$$logTotalFood = 1.327 + 0.641logX_j + 0.156logH_j - 0.004logEd$$
$$ (0.090) \quad (0.014) \qquad (0.020) \qquad (0.003)$$
$$+ 0.008logRE$$
$$(0.004)$$
$$D.W. = 2.013 \quad R^2 = 0.60 \quad F\text{-Statistic} = 563.853$$

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[43] Refer to Kimbo and Cowboy only

$$logClothing = -25.227 + 3.51logX_j - 0.138logH_j + 0.68logEd$$
$$\quad (1.038) \quad (1.038) \qquad (0.238) \qquad (0.029)$$
$$- 0.063logRE$$
$$(1.43)$$
$$D.W. = 2.010 \quad R_2 = 0.239 \quad F\text{-Statistic} = 118.291$$

Where,

log = Natural logarithm

X_j = Total expenditure

H_j = Household size (i:e adults plus children)

Ed = Level of education of the Head of the household in years

RE = Years of urban residence.

D.W. = Dubbin-Watson Statistic

In brackets are the standard errors

The constant terms are expressed in natural logarithms. The negative natural logarithms indicate that all the constant terms are less than one in absolute values save for that of Total food. All figures are given to 3 decimal places.

Note: During the formatting of the research paper, page 42 was left blank and thus has been omitted in this paper. However, no information was lost.